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JUNIOR AND SENIOR HIGH SCHOOLS, COLLEGES,
AND PROFESSIONAL SCHOOLS FOR TEACHERS

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INTRODUCING THE CONTRIBUTORS

The World Our Pupils Face presents a challenge to every American teacher. How this challenge is met will determine America's future. No greater responsibility nor more difficult task has ever been placed upon the shoulders of American educational leaders. Professor Harold C. Hand has stated the problems vividly, briefly, specifically. Few, if any, American educators are in a better position to describe understandingly the world our pupils face. Academically, professionally, and as a World War II veteran (3 and one half years), Professor Hand is well qualified to pass judgment upon present American education. Degrees: B.A. Macalester; M.A. Minnesota; Ph.D. Columbia. Professor of Education at Illinois, he formerly taught at Columbia (1931–1933); Stanford (1933–1940); Northwestern (1940); Maryland (1940–1942); American University of Cairo (1943). A Lieutenant Colonel in the Air Forces during World War II, he served two years as Head of the Army's Education Branch for Africa and the Middle East, then became Head of the Research Branch in General MacArthur's Headquarters in Manila and Tokyo. For this work he was awarded the Legion of Merit.

Suggested Preparation for Teachers of Elementary Science describes how the Cleveland school system is solving the important problem of the inservice science training of elementary school teachers. Miss Anna E. Burgess has been Supervisor of Elementary Science for Cleveland since 1944. Degrees: B.S. and M.A. Western Reserve University.

Science for Elementary School Children suggests possible steps for improving the status of elementary science. Dr. Hazel Floyd, Director of Elementary Education at Stephen F. Austin State Teachers College, served as Intermediate Grade Supervisor in Hammond, Indiana, for three years. Degrees: B.A. North Texas State Teachers College; M.A. Chicago; Ph.D. Texas.

Dr. Thomas F. Barton is Professor of Geography and Chairman of the Department of Geography and Geology at Southern Illinois Normal University. Degrees: B.Ed. Illinois State Normal University; M.Ph. Wisconsin; Ph.D. Nebraska; National Council of Geography secretary (1940–1945); second vice-president (1946); first vice-president (1947).

A Helpful Step in Evaluating Elementary Science Teaching offers practical and timely suggestions for self-evaluation by elementary science teachers. Professor Joe Young West is Chairman of the Department of Natural Sciences, State Teachers College, Towson, Maryland. Degrees: B.S. and M.S. George Peabody College for Teachers; Ph.D. Columbia. Professor West is co-author with Beauchamp and Mayfield of a well known series of junior high school science texts.

Implications of the Training Program of the Armed Forces for Civilian Education evaluates possible contributions that schools may gain by a study of the curriculum, methods, and results of the training programs of the various branches of the Armed Services. Professor Raleigh Schorling is well-known in the field of secondary education and as the author of a series of widely used mathematics texts. Professor in the School of Education of the University of Michigan, he is in charge of the teacher training in the University High School, which he organized in 1922. Degrees: A.B. Michigan; M.S. Chicago; Ph.D. Columbia.

Miss Edna L. Schroder, teacher of kindergarten in the Henry Barnard Elementary School, New Rochelle, New York, suggests opportunities at the kindergarten level for science in the outdoors. The youthful enthusiasm of the author and her children for the outdoors is evident in her article. Degree: B.S. Columbia.

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THE WORLD OUR PUPILS FACE

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THE central purpose of the school is effectively to induct children and youth into the culture—that is, into the world *as it is* and *as it is becoming.*

This is simply another way of saying that the teacher's calling inevitably makes of him a prophet. The children and/or youth he instructs are going to live today and tomorrow, not yesterday.

As he plans his instruction, every conscientious and intelligent teacher constantly asks himself "What, among all the possible things I could plan, will be best for Janie and Johnnie?" To answer this question, the teacher is forced into the role of a prophet—of this there can be no question. The only real questions in this regard are two in number: namely, "Will the teacher *consciously* prophesy, or will he do so unwittingly?" and "Will he be a *good* or a *poor* prophet?"

In order to be a good prophet, one must among other things be intelligently aware of the real world his pupils confront, both *as it is* and *as it is becoming.* It is as an aid to prophecy in this regard that the editor has asked the present writer to sketch the major characteristics of "The World Our Pupils Face."

The author cannot claim that the list which he has presented below is in any sense inclusive. Instead, he has attempted a simple enumeration of the fifteen characteristics which he believes to be the most significant in shaping the world of today and tomorrow, for which we must of necessity educate.

1. *We are living in a world which has been, and which will continue to be, revolutionized by technology.* It is a truism of a high order of triteness to observe that our world in all its aspects has been revolutionized by technologies based upon the steam engine, the internal combustion engine, electricity and chemistry. But trite though this be, it seems to have escaped the effective attention of those who educate, i.e., those charged with the responsibility of creating the "new mind" necessary to cope adequately with the changed and changing conditions which these technologies have induced. That men had not yet effectively *learned* how to live under these conditions is attested by the fact of two global wars and a world wide economic depression within the span of a single generation. All too obviously, the behavior-changing agencies (of which the school is one) of our and other cultures failed to accommodate themselves sufficiently to the new demands which the new technologies have thrust upon them.

Now we stand in the developing presence of nuclear energy—with its promise of great benefits to all mankind if our behavior-changing agencies can and will in time create the "new mind" necessary to its control—with its certain threat of the awful destruction of man and his civilized works if they fail in this the most crucially urgent task ever to confront them. We have in our hands an entirely new and completely revolutionary type of energy whose power dwarfs into insignificance

any, and all combined, kinds of energy which man has known to date. The implications for the school curriculum are tremendous and of the first order of urgency —a fact which one would scarcely suspect from noting the agenda of most educational conferences and conventions of the past several months.

2. *We are living in a closely interdependent world which is destined quickly to become even more tightly integrated.* Again, it is a truism of a high order of triteness to observe that science and invention as applied to production, distribution, and especially to communication and transportation have made of the entire world a small neighborhood, each of whose occupant's well-being is reciprocally related to the fortunes of all others. But, again, this has all too apparently escaped the effective attention of those who educate, for the minds of the typical citizens of this closely inter-dependent world are still too exclusively stocked with the ideas which they "sociologically inherited" from ancestors who lived in low energy societies in which the present "chains" of inter-dependence were relatively but fragile threads.

Atomic energy is already rapidly transmitting these chains into far more pervasive and powerful bands of steel, and will shortly make the tightly-impacted world situation of the early 40's appear by contrast to have been but faintly integrated. In such a world—and we are already well into it—civilized survival will be impossible if the current stock of typical ideas is carried over. But as yet, this urgency is apparently sensed by but a tiny minority of those who educate.

3. *We live in a world of almost complete international anarchy.* This is the blunt, but completely truthful, way of stating the situation. The less offensive way of saying it is to observe that each of the more than sixty national states holds to the idea and attempted practice of unlimited national sovereignty—and teaches in its schools that the highest possible form of patriotism is loyalty to whatever the national state. In spite of an abundance of directly experienced evidence that prosperity and depression, war and peace, are indivisible, the ideas which are our inheritance from a pre-industrial and pre-atomic world still operate to make us guard with the life-blood of our youth the myth of unlimited national sovereignty.

In consequence, we have over three score national states each legally free to do whatever it can of what it wants to do in reference to making trade agreements, raising tariffs, devaluating currencies, establishing dictatorships, perverting education, distorting or suppressing information, raising armies, navies and air forces, stockpiling atom bombs, committing acts of aggression, and declaring war—all regardless of the seriously hurtful effects on other nations. This is the certain recipe for war in a closely inter-dependent world —and, in the atomic age, the recipe for the extermination of civilization. In such a world, to teach that the highest form of patriotism is loyalty to one's national state is now and henceforth education for self destruction.

4. *We live in an age in which world government is the price of civilized survival.* Either the inherited ideas which make men cling so fervently and tenaciously (and futilely, for it is completely unworkable in our inter-dependent world) to the idea and attempted practice of unlimited national sovereignty (world anarchy) must be eradicated, or civilization will be. Given the atom bomb, effective world government, under true world law interpreted by a world court and backed up by a supra-national police power adequate to enforce its decisions, is a survival necessity. Will the world's behavior-changing agencies soon enough sense and effectively enough act in reference to this most urgent of all necessities? The record to date, in this country at least, is not reassuring.

5. *We live in an age in which "white supremacy" all over the world is drawing to a close.* The basis for "white supremacy" (read "exploitation by whites of people of color") lay in the fact that the economic and military processes, tools, and weapons, which were among the first fruits of the industrial revolution, fell into the hands of the white man. Now this "know-how" is diffused all over the earth and this process will continue at an accelerated rate. Before long the imbalance will be sufficiently corrected to permit the people of color successfully to dispute the authority of that one-fourth of the world's population that is white. Indeed, this is even today transpiring in certain parts of Asia. As a *Time* reporter recently wrote, "Throughout most of Asia, the white man is truly hated and the sky is black with chickens coming home to roost."

As Leland Stowe and other observers have reported, the peoples of Asia and Africa increasingly look upon the USSR instead of the USA as their guiding star. This should surprise no informed person, for Russia does not treat people of color as second, third, or even lower class citizens. Unfortunately, America does—witness her Jim Crow laws, her segregated schools, her restricted residential areas, her tradition of "last hired, first fired," the fate of FEPC, intimidation at the polls, lynchings, and the like. Here is indicated a type of "new mind" which our behavior-changing agencies must effectively induce if men are to enjoy peace based on justice—the only possible basis for an enduring peace.

6. *We live in a country in which the natural resources are wearing thin.* Our natural resources are the "ultimate basics" so far as maintaining the life and physical well being of our people are concerned. If and when these are depleted, life will be difficult if not impossible to maintain. Although ours are, for the most part, still comparatively abundant, we are already in a threatening situation in this regard—a fact of which most Americans seem unaware. Renner tells us that ours has been a record of "a prolonged history of waste—a 300-year Roman holiday—with no thought of the future." Coyle, another student of our resources situation, is also alarmed. He writes, "With all our waste, we have not destroyed the country yet. . . . We still have a generation in which either to turn the tide of history toward a permanent country or else to turn it toward that same development that occurred in Babylon, or in the Mayan civilization of the Yucatan, that came, grew, flourished and were glorious, and failed to conserve their soil, failed to conserve their national resources, failed to conserve their people, and passed out of history."

In terms of the glacier-like speed with which basic changes are commonly made in the school curriculum, a generation is a relatively short time in which to create the new mind which must be engendered if ours is to remain "a permanent country" securely rooted in adequate physical and biotic resources.

7. *We live in an age of potential material abundance.* For our part of the western world, this was true even before the advent of nuclear energy. There was no longer any "engineering reason" why poverty and its ugly concomitants, ignorance, disease and misery, had to be tolerated. We had, physically, what it would have taken to turn the trick—natural resources, technology, skilled man power, and managerial ability. But what we did *not* have were the right "pictures in the head." We were held back by horse and buggy, ox cart and even stone age concepts which we had inherited from the long centuries when our forefathers lived under necessary conditions of scarcity—held back by an inherited "common sense" which made sense in an age which no longer exists.

Only in terms of the captive power of these completely out-moded ideas could anyone possibly explain such weirdly anti-social behavior as we have witnessed, even

applauded, within the past 20 years; viz., dumping oranges in the ocean, burning great piles of wheat and coffee, slaughtering little pigs, plowing under cotton, paying farmers for not producing, featherbedding by labor, withholding of production by manufacturers—while one-third of our nation was ill-clothed, ill-housed and ill-fed, and even larger numbers of people in other parts of the world were in dire want.

With the advent of nuclear energy, a technology of transmutation promises to supplant our present technology of manufacture. Potentially, Virgil Jordan tells us, "We can now make anything—materials, machines, and energy—out of anything or nothing, in any amount, almost without measurable cost." The age we are entering, says this President of the National Industrial Conference Board, will be an era of "limitless production" in which "the main economic problem will probably be to get the product consumed."

Except in time of war—when we temporarily laid aside the "sound" ideas which we had inherited from our pre-industrial forefathers—we have never been able to make the machine produce up to capacity. By vainly but none the less stubbornly attempting to make the facts of the machine age fit into the framework of inherited ideas, we crippled the machine—with resultant want in the face of potential abundance. New mind we obviously needed, but our behavior-changing agencies failed to create it.

How very much greater the indicated task of our mind-forming agencies will be in the atomic age we have now entered it is difficult even to conjecture. With what entirely new "pictures in the head" must we be equipped, if Jordan is correct in his statement that "It must be plain already that some other way of distributing the products of industry for consumption or use than by means of money wages, interest, dividends, or profits proportioned to time, effort, or thrift, or collective 'bargaining,' must be discovered"?

8. *We live in a country in which economic and political power is highly concentrated.* At the beginning of the Republic approximately 90% of the workers were "on their own"—they owned their own farms, shops, tools, etc. Only one man in ten was "beholden" to another for his daily bread. This supplied the necessary basis for an admittedly rough but very effective type of economic and social democracy. On these foundations, as Counts has pointed out, the common people fought for and won a very considerable measure of political democracy—as the various amendments to the Constitution will attest.

Today, the two sets of percentages are almost exactly reversed. Only one man in ten is "on his own"—the other nine are on somebody's pay roll. Our economic democracy is thus largely gone; our social democracy is rapidly disappearing. Political democracy remains. The problem is whether we shall be able to use the latter to re-gain the other two. If we cannot, or will not, then the progressive disappearance of political democracy from the American social scene seems inevitable. For when men must choose between bread and freedom, they take the former.

Here, then, is another societal problem with which our mind-forming agencies should actively be concerned.

9. *We live in a country in which private investment opportunities have declined.* This is not because of the sins or the virtues of either the Democrats or the Republicans. Basically, this fact emerges from the operation of three long-range non-political causes; namely, the closing of the frontier, the slowing down of population growth, and the "rising tide" of technology.

In our kind of an economy, unemployed capital means unemployed men and all the frustration and misery that goes with economic depression. Some sort of a "mixed economy" is clearly indicated if adequate purchasing power is to be provided to keep capitalism afloat. That this runs counter to various of our inherited ideas is only

too apparent, but that it is now necessary our government has admitted in principle, by legislating its newly inaugurated Council of Economic Advisors—an admission of the necessity of the basic principle underlying the Murray-Wagner-Dingle Full Employment Bill, which a Congress still too largely dominated by a pre-industrial mentality was unable to bring itself to enact into law.

It can confidently be predicted that the enactment of some such law will before long prove to be the price of retaining much semblance of "free enterprise." But, again, the creation of new mind is a necessary prior accomplishment.

10. *We live in an age of lessened vertical mobility.* Every carefully conducted research study related to this question reveals that the "escalators" in American society are not working as effectively as is popularly supposed. The public school system is principal among these escalators, and it has been found to be faulty in this regard to a very serious degree. It has been revealed that the accident of birth in an economic sense is the major factor in determining how far a youngster will progress in school, which in turn determines his occupational and hence economic status, which in turn determines how far *his* children will progress in school, and so on and on.

When study after study reveals that the odds are in the order of 10 to 1 that the poor, as compared with the wealthy, child will not get as far as high school, it can scarcely be said that we have anything which closely resembles equality of educational opportunity. What we have, instead, is the rigidifying if not the widening of class distinctions.

Studies also reveal that the supposedly free American secondary school is anything but free—that it costs a youngster an average of about $125 per year to pay the numerous "hidden tuition" charges which have been insinuated into the corporate life of the school.

Here is an internal problem in reference to which the creation of new mind—lay as well as professional—is clearly indicated as necessary for societal good health.

11. *We live in an age of increased and increasing leisure.* Although this is a truism which has been apparent for years, it cannot be truthfully said that the school has yet taken adequate effective account of it. By definition, when a man is adequately prepared to use his leisure time wholesomely, he is equipped with a variety of inner resources—a variety of appreciations and skills.

That the schools have not gotten sufficient of these necessary inner resources into the nervous systems of our population was all too apparent in the typical behavior of our troops overseas in the recent war. In a very sizable minority, if not the majority of cases, these men lacked "what it takes" to utilize leisure in any satisfyingly wholesome way. Instead, most were chronically bored. Not a few fell back upon the time honored devices of drinking and gambling to excess and of making illicit sex contacts in their attempts to escape a boredom which was intolerable.

12. *We live in a country in which family, church and neighborhood controls have lost their former authority.* This has resulted from a variety of causes, principal among which are the virtual disappearance of the family as an economic unit, the failure of most churches to capture the interest of youth, and the increased horizontal mobility of a population equipped with automobiles and surfaced highways. But whatever the reasons, the consequences as reflected in the statistics of juvenile delinquency clearly suggest that our mind forming agencies have not kept abreast of the times. Obviously, if youth are out from under the external restrictions which tended to keep former generations socially "in line," it is apparent that they must acquire (i.e., learn) self-imposed standards of behavior.

Teaching youth to behave properly and

responsibly on their own is a far more difficult task for the school than merely making some authority-invested teacher or other official responsible for their proper behavior, but this is what the times demand. This societal need the traditional authoritarian school can never be expected to fullfill. If young people are to acquire the ability and the willingness to behave properly and responsibly on their own, they must have years of satisfying experience in doing precisely this. The discipline appropriate to a free man is seldom acquired by following a jail-like routine.

13. *We live in an age dominated by secondary groups.* The corollary of this readily apparent fact is that things today get done by social organization, if they get done at all. For example, the individual worker in a great industry is helpless except as he acts in concert with his fellow workers. To illustrate further, the Congress listens not to individual citizens as such but to the representatives or spokesmen of groups that can "deliver the vote;" it would appear that an exception must be made for those few who can and will deliver large campaign contributions, but these individuals are usually high in the councils of the NAM or the USCC, both of which are secondary groups of the first order of economic and political power.

As Ross has observed, this transition from a primary to a derivative group culture has left us in a sorry situation, in that we are still attempting to apply the canons of primary group righteousness to control the behavior of secondary groups. These canons were never designed for this purpose, hence do not operate at all effectively. Here, then, is indicated still another instance in which new mind is urgently needed.

14. *We live in a country in which the most powerful mind-forming agencies are privately owned and controlled.* Reference here is to the press, radio and motion pictures. Both individually and collectively, these agencies dwarf the school.

In nearly all important instances these agencies are dominated by the profit motive. Though this is self-righteously denied, social betterment is usually subsidiary to profit making. The personal economic, political and other interests of the owners usually dictate and always color the way in which events are reported (press and news reels), what types of programs are offered (radio), and what plays are produced (movies). Except for the radio in a limited sense (FCC), these agencies are under no public control and are sometimes (frequently in the case of newspapers) used as personal weapons by their owners in their attempts to get whatever it is that they want. None is so structured as to reflect the total social interest.

An important corrective role is clearly indicated for the school. It has been demonstrated that pupils can be taught to read newspapers, listen to the radio, and select motion pictures with discrimination. Were all youth effectively so taught, it would not be long before it would not pay to commit the sins against good taste and decency which today prove profitable to many owners of the press, radio and motion pictures.

15. *We live in a world in which almost every imaginable type of new mind is required for societal good health.* Fourteen important categories of needed new mind have been briefly characterized above. These are but a few of the many which the total problem of social lag would yield, were it possible to continue our analysis.

Inasmuch as we are demonstrably living in a revolutionary age, this analysis should extend to every basic function of human living, and its fruits should be utilized as the basis for designing the "common learnings" aspect of the curriculum extending from the kindergarten through the entire span of formal education. For only as the school (and the other mind-forming agencies) can engender a new "common sense" which actually "makes sense" in the age in which our pupils are destined to live can we reasonably expect to survive in any civilized sense.

SUGGESTED PREPARATION FOR TEACHERS OF ELEMENTARY SCIENCE

ANNA E. BURGESS
Supervisor of Elementary Science, Cleveland

THE progress of elementary science, which includes the years from kindergarten through grade six in some school systems and through grade eight in others, is being definitely hampered by the scarcity of teachers prepared to teach that subject, and not enough is being done about it. A few teachers' colleges have developed a sequence of courses intended to give the elementary teachers the background of content and method in science that they will need. Others are relying upon the liberal arts offerings in science to fulfill the requirement. Some universities are preparing science teachers for secondary schools only, not realizing that science experiences in the elementary school under the guidance of a well-prepared teacher, may be the fundamental motivation for future scientists. College courses definitely designed for elementary science teachers already in service are offered too rarely to meet the need.

Both teachers in training and teachers in service should have the privilege of majoring in elementary science. They should not be required to major in biology, or geology, or chemistry, or physics if they plan to remain in elementary science teaching. The elementary science teachers need to know the simple fundamentals of many sciences, plus the methods that will show them how to develop the basic understandings appropriate for the different grade levels. They need practice in handling materials, in devising simple experiments, in conducting field trips, and in directing a variety of pupil learning situations. The teachers in service realize this need, but only occasionally can they find college courses which will help them. Many of them have Bachelor's Degrees and would like to work toward a Master's in Elementary Science Education. Others merely want to become more proficient in their chosen field. It is the duty of the supervisors of science to find ways to help them.

In Cleveland, where an extensive program in elementary science has been in progress for over fifteen years, we decided to study the problem of college courses for teachers of elementary science in service and in training. We assembled a working committee consisting of the following personnel:

- The directing supervisor of science of the Cleveland Public Schools
- The supervisor of elementary science in Cleveland
- One professor from Western Reserve University
- The supervisor of science in one of the suburbs
- The principal of the elementary science curriculum center school in Cleveland
- An assistant principal of a large elementary school (formerly a teacher of elementary science)
- Seven teachers of elementary science from city and suburban schools

The above committee met every two weeks for a period of approximately two months. At the first meeting the discussion brought out these ramifications of the problem:

- Courses are needed that are definitely slanted toward the needs of the teacher of elementary science
- Refresher courses are needed for experienced teachers
- Content courses which include methods for teaching said content in elementary schools are needed
- Courses should be planned for the undergraduate who wishes to teach elementary science
- Courses should be offered that can be applied toward a Master's Degree
- Courses should be given at a time when teachers can take them, preferably in the late afternoon
- Elementary science teachers now in service need new methods, need to be brought up to date in many fields, and need a good, simple foundation in many sciences

Do enough teachers desire courses in elementary science to justify establishing a

program? This was the next topic discussed by the committee. In order to sound out the large body of teachers who might be interested in the program if it could be worked out, the committee sent out a questionnaire, on which the teachers could indicate in what courses they would be interested. The questionnaire and the tabulation of the returns are indicated on the form which follows:

TABULATION OF RETURNS FROM QUESTIONNAIRE

To Teachers of Elementary Science, Kindergarten to Grade Six:

In response to the need for college courses in science and science education designed primarily for the teachers of elementary science, a committee has been preparing some suggestions to be presented to Western Reserve University asking them to plan such courses in the future. The request will have more weight if we can indicate approximately what the demand for such courses may be.

If courses in any of the following fields could be scheduled at a time convenient for you and you could be given graduate or undergraduate college credit for them, for which subjects would you probably register? Please check. *It is to be distinctly understood that this in no way obligates you.* It is merely to ascertain the approximate demand for courses.

54 Astronomy
25 Biology
21 Chemistry
38 Geology
20 Conservation (camp laboratory course)
58 Conservation (classroom and field trip course)
23 Meteorology
51 Aviation
27 Physics—Magnetism
Electricity
Light
Sound
66 Radio and allied materials, e.g., television
18 Physics—Simple machines
Heat
Air
Liquids
74 Health Education
72 Plant Life of Cleveland
20 Ecology
85 Birds
40 Insects
50 Trees
30 General Zoology
189 Science units for primary classes
75 Science units for upper elementary classes
43 Workshop for teachers of science in grades 4, 5, 6, e.g., to work out units, to outline science curriculum

What other courses in Science or Science Education would you like to have offered at Western Reserve University?

_____

_____

NAME_____

SCHOOL_____

Additional courses that were suggested included:

Art and handwork to correlate with science
Simple electronics
Science for children at kindergarten level
Field courses
Photography
Current history of science

Convinced that there was a demand, the committee organized itself into sub-committees to outline what the content of such courses should include to give the teacher a background of knowledge fairly adequate for elementary school. Each course, it was understood, was to include, besides the content, some activities which could be used or adapted for use with young children. The sub-committees outlined subject matter for astronomy, aviation, chemistry, conservation, geology, health education, meteorology, physics, plant study, and zoology. These outlines follow:

Problems in Astronomy

I. What does the solar system include?

1. The sun
   a. "Center" of the solar system
   b. Main source of light and heat for life upon the earth
   c. Distance from the earth
   d. Sun spots
   e. Solar corona
2. The planets
   a. Hypotheses concerning origin
   b. Differences between planets and stars
   c. Law of gravitation as affecting the solar system
   d. Orbits of planets
   e. Specific facts about the nine known planets
   f. Visible planets
   g. Asteroids
3. Meteors and meteorites
   a. Explanation
   b. Meteoric showers

4. Comets
    a. Nature of comets
    b. Orbits
    c. Famous comets

II. How do some movements of the earth affect life upon this planet?
1. Rotation
2. Revolution

III. What is known about the moon?
1. Size
2. Distance from earth
3. Topography
4. Absence of atmosphere
5. Phases
6. Effect upon tides
7. Eclipses

IV. What is beyond the solar system?
1. Our galaxy—the Milky Way
2. Stellar distances and movements
3. Evolution of stars
4. Other galaxies

V. What constellations are visible during the year?

VI. How do astronomers use observatories, telescopes, spectroscopes, etc.?
1. Make a special study of the reflector and refractor types of telescopes, and of the Schmidt type telescope at the Taylor Road Observatory.

Problems in Aviation

I. A brief history of man's attempts to fly.
1. Wings of various materials attached to the human body
2. Balloons
3. Gliders
4. Gliders with motors
5. Helicopter
6. Jet-propulsion

II. Why do balloons stay in the air?

III. What are dirigibles and how are they used.

IV. What keeps airplanes in the air?
1. Principles of flight
2. Parts of a plane—use of each
    a. Fuselage
    b. Engine or engines
    c. Propeller
    d. Wings
        (1) Factors affecting wing lift
        (2) Ailerons
    e. Landing gear
    f. Tail assembly
3. Instruments and controls which help to fly the plane
    a. Altimeter
    b. Compass
    c. Air speed indicator
    d. Rudder control bar
    e. Stick or wheel
    f. Ignition switch
    g. Throttle

V. Agencies which help pilots.
1. Weather Bureau
2. Civil Air Authority

VI. Airplane routes.

VII. Personnel.

Problems in Chemistry

I. How are the known chemical elements significant in daily living?
1. Source and distribution of elements
2. Economic significance
3. Characteristics that determine use

II. What is chemical change and why is it important?
1. Distinction between physical and chemical change
    a. Students should perform simple experiments to demonstrate these
    b. They should learn to interpret chemical changes common to everyday living
2. Some common compounds, their characteristics, compcsition, and use

III. Special study of oxidation
1. What happens when things burn
2. What conditions are necessary
3. Effects of different rates of oxidation
4. How to kindle a fire
5. Sources of fuel
6. How to put out a fire
7. Chemical fire extinguishers and how they work

IV. What are some of the newer discoveries in the field of chemistry?

1. Plastics
2. Synthetics, etc.

Problems in Conservation

NOTE: Conservation can be taught most effectively at a conservation field laboratory. It is suggested that the University cooperate with the State Education and Conservation Departments in setting up a summer camp for this purpose. It should be possible for students to obtain either graduate or undergraduate credit for their work.

A spring-term course in conservation should also be offered in Cleveland. This course should include many field trips and demonstration projects. Suggestions for many activities are to be found in *Conservation for Tomorrow's America*, by Ollie E. Fink.

If the members of the class are not familiar with the trees, birds, mammals, wildflowers, etc., of the area, the instructor may wish to include some identification of the more common species. This can be an incidental part of every field trip.

The problems listed below are essential:

I. What is the meaning of conservation as a "way of living"?
   1. The wise use of natural resources
   2. Responsibility of consumer for conservation

II. What is the danger of disrupting the conservation cycle?
   1. This will necessitate considering the relationships which exist among living things

III. How can we solve the problems in the conservation of soil and water?
   1. Present conditions in various parts of United States, with special emphasis upon Ohio
   2. Methods of conserving soil
   3. Methods of conserving water
      a. The water cycle
      b. The water table

IV. What must be done to conserve forests and wildlife?

V. How can we conserve our mineral resources?
   1. Soil minerals
   2. Industrial minerals
   3. Fuels

VI. What is the socio-economic significance of conservation?
   1. Relationship between nutrition and soil fertility
   2. Relationship between economic status and local soil and water conditions

VII. What are the advantages of land use planning?

VIII. How do existing conservation agencies function?

Problems in Geology

I. What hypothesis concerning the origin of the earth is most acceptable to scientists?
   1. A brief consideration of such hypotheses as the nebular, the planetesimal and the gaseous-tidal.

II. What rocks are found on the earth?
   1. The three classes of rocks
      a. Formation
      b. Characteristics
      c. Uses

III. What are the important minerals?

IV. What rocks and minerals are found in the Cleveland area?
   1. Much time should be spent on this problem
   2. Many field trips should be taken
   3. Students should collect and label specimens of rocks and minerals

V. What forces change the surface of the earth?
   1. Trips should be taken to find evidences of these forces at work around Cleveland
   2. Consideration should be given to the effects of these forces in other parts of the world

VI. How is soil formed?
   1. Types of soil
   2. Dependence of life upon soil

VII. How have living things developed on the earth?
   1. Representative animals and plants of each era
   2. Interpretation of Cleveland area through rock formations and fossils

Problems in Health Education

NOTE: In certain situations in the elementary schools health units are taught in connection with the science program; in other situations health education and science units are organized as separate programs. In both instances the science instructor will frequently be the person selected

to teach health education. Hence, the need for science teachers being adequately trained in the field of health education. In arriving at the selection of topics, the following factors were considered:

1. Health units which have been included in Books I, II, and III of the *Discovering Our World* science series for grades 4, 5, and 6 were examined. These books are basic texts in the program of elementary science, Cleveland.
2. Health units which have been included in the upper elementary health education curriculum for the Cleveland schools were studied.
3. New medical and health discoveries which are basic in the training of science and health education teachers were considered.

Suggested Topics

I. Growing Up
   1. New ways of measuring growth
   2. Current concepts of growth charts
   3. The physical examination today
   4. Desirable approaches to teaching growth concepts
   5. The relation of rest, rhythm, and exercise to growth

II. Eating for Vim, Vigor, and Vitality
   1. The "basic seven" food concepts
   2. Menu planning today
   3. Vitamins brought up to date
   4. Minerals and their significance in the diet

III. Keeping the Body in Health
   1. Dental hygiene today
   2. Bones, muscles, and posture
   3. Caring for the feet
   4. Conservation of eye-sight
   5. Hearing problems and their solution
   6. Skin diseases
   7. Probing man's interior (basic physiology with demonstrations on human cadavers)

IV. Promoting Mental Health
   1. Methods of teaching desirable patterns of human behavior
   2. Psychiatric solutions of behavior problems
   3. Facilities for handling behavior problems
   4. Endocrinology and behavior
   5. Technics for teaching mental hygiene

V. The Problem of Sex Education
   1. Desirable sex concepts for the respective levels of instruction
   2. New technics for handling sex education
   3. Materials and facilities that can be used in handling the sex education problem
   4. Methods of handling abnormal sex behavior problems

VI. Fighting Disease Today
   1. General principles of bacteriology
   2. Tropical diseases and their post-war significance
   3. An analysis of the "killers"—heart disease, cancer, venereal disease, and tuberculosis
   4. Gleanings from sanitary procedures developed during World War II
   5. Sulfa drugs
   6. Serums, plasma, and blood "banking"
   7. Vaccines
   8. Penicillin

Problems in Meteorology

I. What are the atmospheric elements that influence weather?

1. Temperature
   a. Sources of atmospheric heat
   b. Effect of insolation
   c. Day and night
   d. Seasons—it is advisable at this point to review the movements of the earth
   e. Heating and cooling of land and water surfaces
   f. Daily and seasonal change of temperature

2. Precipitation
   a. Evaporation
   b. Condensation
      (1) Causes—dew point
      (2) Methods of cooling the atmosphere and resulting forms of condensation—frost and dew
      (3) Forms of precipitation: rain, snow, sleet, hail
      (4) Clouds types
   c. Humidity

3. Movement of air masses
    a. Vertical—convection currents
    b. Horizontal
        (1) Causes of wind
        (2) Wind belts of the earth
        (3) Tornadoes, cyclones, etc.
    c. Wind direction and velocity
    d. Thunder storms

II. How does the Weather Bureau operate to inform the people of future weather?
1. Weather forecasting
2. Interpretation of weather maps
3. Weather instruments
    a. Anemometer
    b. Thermometer: wet and dry bulb, Fahrenheit, Centigrade
    c. Sunshine recorder
    d. Rain gauge
    e. Barometer
    f. Radiosonde
    g. Balloons

(Every teacher should have the opportunity to make some of these weather instruments as classroom activities.)

III. How does weather affect man's activities?
1. Aviation
2. Farming
3. Fishing
4. Shipping of perishable goods
5. Sports
6. General influence

Problems in Physics

The teacher of elementary science needs a much larger background in physics than she will teach in the classroom. This enables her to answer questions intelligently and to guide the children in acquiring correct concepts. A course in practical or applied physics (non-mathematical) which is full of experiments that the teacher can perform in her own classroom with simple equipment would fit the needs of the elementary science teacher.

I. How does the air do work for us?
1. Heights and weight of the atmosphere
2. Molecular motions in gases
3. Using the energy of wind
4. Air pressure
5. Use of air pressure in our everyday lives

II. What characteristics of liquids serve our needs?
1. Molecular motions in liquids
2. Adhesion and cohesion
3. Capillarity
4. Three states of matter
5. Pressure in liquids
6. Hydraulic brakes, lifts, etc.

III. How does heat contribute to the comfort and convenience of living?
1. Nature and source of heat
2. Effect of heat on solids, liquids, gases
3. Measurement of heat
4. Conduction, convection, radiation
5. Heating our homes
6. Refrigeration

IV. Why is light an important form of energy?
1. Nature and source of light
2. Reflection, absorption, and transmission
3. Laws of illumination, reflection, and refraction
4. Analysis and synthesis of light
5. Lighting for home and classroom
6. Simple photography
7. Photosynthesis

V. How does sound enrich our lives?
1. Nature and source of sound
2. Media through which sound travels
3. Noise and music
4. Pitch and intensity
5. Musical instruments
6. Canned sound

VI. What are the practical uses of magnetism?
1. Theory of magnetism
2. Natural magnets
3. Temporary and permanent magnets
4. Laws of magnets
5. Magnetic field
6. Terrestrial magnetism

VII. How has electricity changed our ways of living?
1. Static electricity
2. Electron theory
3. The dry cell
4. Electric currents
5. Electro-magnets
6. Induced currents and their use

7. Uses of electricity: telegraph, telephone, lights, heaters, motors

VIII. How do simple machines make work easier?

1. Definition of machine
2. Wheel and axle
3. Lever
4. Inclined plane
5. Screw
6. Wedge
7. Pulley
8. Applications of above

Problems in Plant Study

NOTE: The material in this outline could well be considered in three separate courses, as indicated by dotted lines.

I. What kinds of plants can be found around Cleveland?

1. Review of characteristics, growth, reproduction, and significance of:

   a. Algae
   b. Fungi: bacteria, molds, yeasts, mushrooms
   c. Lichens
   d. Liverworts and mosses
   e. Ferns
   f. Seed plants: conifers, monocotyledons, dicotyledons

NOTE: This general study should not be encumbered with too great detail, such as is usually incorporated in Biology 101 and 102.

II. How do plants make or secure food?

1. Review of the life functions of plants such as:

   a. Cell structure and division
   b. Photosynthesis in green plants
   c. Respiration and transpiration
   d. Special adaptations for seed dispersal, securing food materials, storing food

2. Substances derived from plants

III. What are some of the newer discoveries of plant uses? of plant culture?

IV. What trees are to be found in the Cleveland area?

1. Identification on field trips
2. Growth
3. Enemies of trees

V. How can the wildflowers of the Cleveland area be preserved?

1. Identification of common species
2. Trips to wildflower preserves

VI. How can we make a successful garden?

1. Planning the garden
2. Preparing the soil
3. Planting
4. Caring for the garden
5. Controlling garden pests

Problems in Zoology

NOTE: The teacher of elementary science should acquire a working knowledge of the characteristics of the groups of animals, with the main emphasis being given to external features, adaptation to environment, food, growth, reproduction, behavior, interrelationships with other living things, and economic importance. Internal structure of animals is not usually taught to pupils of elementary school age.

If possible, the students should learn how to care for such animals as may be brought to the elementary classroom.

The dotted lines indicate possible division of this material into two courses.

I. What are the great divisions of the animal world?

1. Protozoa
2. Porifera
   a. Sponges
3. Coelenterata
   a. Jellyfish
   b. Corals
4. Worms (parasitic)
   a. Flatworms
   b. Roundworms
5. Echinodermata
   a. Starfish and related animals
6. Annelida (segmented worms)
   a. Earthworm
7. Arthropoda
   a. Crustaceans
   b. Insects
   c. Spiders
   d. Myriapods
8. Mollusca
   a. Snails
   b. Bivalves
   c. Squids and octopuses
9. Chordata
10. Vertebrata
    a. Fishes
    b. Amphibians
    c. Reptiles
    d. Birds
    e. Mammals

II. What groups of mammals are found on the earth?

III. What birds are found around Cleveland?

1. Identification
2. Habits

(An entire course may be devoted to bird study)

IV. What is the economic importance of insects?

(An entire course may be devoted to insect study)

After the reports of the sub-committees had been criticized and completed, the supervisors sat down with the representative from the university and planned a suggested time allotment and credit value to be assigned to the courses requested.

SUGGESTED TIME ALLOTMENT OF COURSES FOR TEACHERS OF ELEMENTARY SCIENCE

(Basic value: 3 credit hours for semester)

Subject	*Semesters*	*Credit Hours*
Physics	2	6
Chemistry	1	3
Zoology (Problems I and II of outline)	1	3
Plant Study (Problems I, II, and III of outline)	1	3
Field Course: Birds, Trees, Insects, Wildflowers	1 (summer)	3
Health Education	2	6
Earth Science:		
Astronomy	1	3
Physical Geology	1	3
Historical Geology	1	3
Conservation	1	3
Air, Weather, and Aviation	1	3
Science Workshop for Teachers of Primary Grades	1	3
Science Workshop for Teachers of Upper Elementary Grades	1	3

Finally, the committee chairman wrote a letter to the University to accompany the outlines. In this letter was stated the needs as analyzed by the committee and the recommendations in brief. Parts of the letter as quoted below summarize the problem and the procedure followed in attacking it.

"Many teachers of science in the elementary school are desirous of having college courses offered which are designed for their teaching area. Student teachers preparing for elementary school also need a definite program in science.

"Those who teach elementary science need to have a broad background, covering many sciences, rather than an intensive knowledge of one science. Simple concepts in physics, aviation, chemistry, astronomy, geology, meteorology, health education, and plant and animal life enter into the courses of study for grades one to six. But elementary science teachers need not only an informational background of these subjects; they also need opportunities to devise and carry out simple experiments with simple apparatus, which can be used in the elementary classroom; they need to learn how to care for plants and animals in the schoolroom; they should be able to identify species of trees, birds, insects, mammals, and rock formations common to the Cleveland area. Above all, they should be given the functional approach to science, rather than the merely academic, so that in their teaching they will organize the basic understandings of science around aspects of daily living and problems that arise in the pupils' environment.

"Because many of the teaching personnel who would be interested in these courses already have a Bachelor's degree, the committee recommends that both graduate and undergraduate credit be allowed.

"The committee further recommends that, if possible, some of the courses be set up as Education courses and some as Science courses, and that they be offered at a time when both in-service and in-training students can attend them. Such times could be at 4:30 in the afternoon, at 7:00 in the evening, on Saturday mornings, and during summer school sessions.

"It is also recommended that the teaching of science in the elementary school be made as attractive as possible to the student teacher, as the need for teachers prepared for that work is becoming increasingly acute. Many opportunities should be given to the student teachers to visit and participate in elementary science classrooms.

"Members of the Science Education Committee have attempted to list the phases of the various subject-areas which enter into the elementary science courses of study in Greater Cleveland. These lists are enclosed with this letter.

"In order that the University may have some idea of the demand for such courses, a tabulation has been made showing probable candidates for courses as listed on the accompanying questionnaire."

Because "we cover the universe" in elementary science, the background which the teachers desire to attain must not be too specialized. However, after they have become oriented in all the needed areas they can then specialize in any field that attracts them.

SCIENCE FOR ELEMENTARY SCHOOL CHILDREN

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IN view of the fact that a major purpose of all education is to orient individuals to their world, the elementary school cannot afford to neglect giving its children an understanding of the subject matter and method of science. Also, in as much as another major objective of education is to help usher in a better world, the elementary school is the place in which to emphasize the basic truths, attitudes, and habits which are to characterize the masses. Science education must be a part of the education of all. The benefits resulting from scientific developments can be utilized as aids to richer living only when the lay public has been trained in their possibilities and corresponding responsibilities. Science can benefit mankind only if it is used in such a way as to promote the welfare of mankind.

The elementary school is the universal institution for the education of the masses. If the national level of scientific interest, understanding, and thinking is to be raised, it becomes necessary to concentrate on "all the children of all the people". There is no escaping the responsibility for the general diffusion of science learnings, and this obligation must be shared by the public elementary school and the institutions which train the public elementary school personnel.

Is Elementary Science Gaining Ground?

Prior to the War, the answer could have been in the affirmative. Although figures are not available, there is some indication that elementary science has possibly lost ground, especially during the last five years. It is the rare "emergency" teacher who is science-trained, and many schools have had to fall back on "emergency" teachers. Schools were fortunate to have even these inadequately trained teachers.

According to a survey [1] in 1943 of organizational and administrative practices in the elementary school in the United States, we find under "major ways in which this year's program differs from last year's program" that only two per cent of the schools reported greater emphasis on "science and conservation", and only one per cent reported the addition of elementary science. The survey [2] further reveals that only 40 per cent of the eighth grades had science and that the per cents for each of the other grades were lower respectively. A survey [3] in 1933 had previously shown that approximately 80 per cent of the schools offered science in the grades. Thus a comparison of the data presented by Otto and Noll would indicate no gains in elementary science offerings, possibly even a loss. It may be that more adequate and complete information would reverse the presented data.

In spite of the fact that relatively few studies have been reported for recent years, science in the elementary school has received more attention in professional writings than it has received in school situations. Practice always lags behind theory, but need it be so far behind as it now is?

Why Has Practice Lagged So Far Behind Theory?

The discrepancy between practice and theory pertaining to elementary science education can be attributed, in part, to (1) failure to recognize the possibilities which

[1] Otto, Henry J. *Organizational and Administrative Practices in Elementary Schools in the United States*, University of Texas Publication, November 22, 1945, Austin, p. 39.

[2] *Ibid.*, p. 58.

[3] Noll, Victor H. *Teaching Science in Elementary and Secondary Schools*, Longmans, Green and Co., 1939, p. 75.

science offers for the development of the child, (2) the over-crowded condition of the elementary school curriculum, (3) the difficulty of harmonizing the science program with the various types of curriculum organization, (4) the lack of agreement as to the most desirable content and organization of the science curriculum, and (5) the lack of teachers who are trained (and inspired) to teach science to children.

What Are Some Possible Next Steps Toward Improving the Situation?

1. In connection with the failure to recognize the possibilities which science study offers for child development, attention needs to be called to such facts as: (a) every child can succeed in science; (b) success helps to give the child self-confidence, as well as status in his group; and (c) science contributes to the realization of the potentialities of all children by satisfying interest, curiosity, aptitude, as well as the desire to manipulate, construct, and create.

2. Although the elementary school curriculum is crowded, science must not be omitted. Due notice should be given to the evidence[4] that, with the addition of science, skills in the other subjects not only need not suffer, but may actually be improved.

3. Stress should be placed on the fact that there need be no conflict between types of curriculum organization in general and the science program. No "experience curriculum" for example, would be complete without science experiences and science must be "experienced". Science learnings are ideal "cores" or "centers of interest". If the emphasis is on "integration", science relates itself to all the other subjects, and it also makes the maximum contribution to personal integration.

4. It is imperative that further attention be given to the content and organization of the science curriculum, including such findings as: (a) somewhere between the extremes of a simple nature course and the academic treatment of bodies of science information lies the optimum curriculum plan for elementary science; (b) the bulk of the evidence is on the side of curriculum organization according to science concepts or generalizations, which appeal to and are within the comprehension of children; (c) materials for teachers, as well as those for pupils, need to be prepared according to the plan of teaching generalizations; (d) teachers must be taught by the method which they are expected to use with children; and (e) research should be conducted in order to determine the most desirable sequence for learning science concepts and to arrive at grade placement scientifically.

5. Steps must be taken to improve the training of teachers of elementary science, realizing that (a) if the level of scientific interest and understanding is to be raised, elementary children must be reached through their teachers; (b) that science in the grades will be taught by the classroom teacher and not by a special science teacher; (c) that some person or persons in each teacher training institution, preferably in the science department, must feel some concern for the elementary teacher's needs and that, while it may be more stimulating to teach science majors and premedical students, the teaching of elementary majors is more far-reaching, if not more important; (d) that the course should be a general, non-technical one, covering only the simplest basic science learnings, with the emphasis on first-hand experiences and on developing a genuine interest in the subject and in teaching it to children; (e) that more science courses, general in type, should be made available in high school; (f) that teacher-training institutions should show more interest in helping teachers now in service; and (g) that administrators must help the elementary teacher and also make it possible for others to give her the assistance which she needs.

[4] Melrose, Mary. "Significance of Science in the Elementary School," *NEA Department of Science Instruction 1939 Proceedings*, p. 68.

What Are Reasonable and Attainable Claims for Elementary Science?

According to Blough [5], elementary science (1) capitalizes on children's interests and opens new avenues of interest, (2) cultivates a scientific way of looking at things and gives a sound method of procedure for solving problems, (3) teaches certain concepts and generalizations which children can use in interpreting what they see about them, (4) assists in the development of social behavior, and (5) aids in developing appreciation for the environment. Real values, to be sure, are apparent in changed attitudes and actions. Even elementary children can begin to assume responsibility for the use of science for the welfare of mankind. Teaching science to "all the children of all the people" can help to make for richer living for all.

[5] Blough, Glenn O. "Elementary Science Objectives." *School Life*, 29:29 (October, 1946).

TEACHING ROCKS IN THE LOWER GRADES

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A CAREFUL examination of science books for the lower grades reveals that the topic of rocks is either omitted or hastily and inadequately treated. You will find difficult material of a biological nature often introduced in the first grade book while in the same series you often find that rocks are scarcely mentioned in the third grade book. It may be true that the study of rocks is not as interesting, appealing or colorful a subject as butterflies or other biological phenomena. Nevertheless, rocks do draw universal interest from children.

For the teacher to develop a pupil's normal curiosity in such an important element of the local physical environment, it is important that she know the subject and have interesting methods of presenting it. It is hoped that this article will give helpful and practical suggestions to the lower grade teachers and supervisors.

BASIC CONCEPTS

For the teacher to know where she is going, to stay "on the beam" so to speak, and to know when she has arrived, she should have in mind definite basic concepts for each unit. The preparation of these concepts is obtained by synthesis and many teachers lack the background in subject matter to ascertain thoroughly the concepts which should be taught. For them, the following list of basic concepts is suggested:

Group One

Rocks have different colors, sizes and shapes.

Rocks vary in hardness.

Rocks are broken in many ways.

Some rocks are porous (not solid) and contain air and water.

Group Two

Rock is found everywhere beneath the ground.

Rocks are found in layers called beds.

Rocks can be seen on the surface of the earth at many places.

Man uses rocks in building and road making.

Concrete is a man-made rock.

Group Three

Sedimentary rocks are composed of sediments like sand, lime, clay, vegetation and sand, gravel, clay, etc., cemented together.

Sedimentary rocks are identified in several ways.

Heat and pressure changes sedimentary rocks into metamorphic rocks.

There are three big classes of rocks: namely, sedimentary, metamorphic and igneous.

Rocks tell stories.

METHODS OF PRESENTING CONCEPTS

There are at least seven important methods by which primary science may be successfully introduced to the child. These are: 1. Experiments and demonstrations,

2. Stories, 3. Short explanations, 4 Pupil observation, description and interpretation, 5. Visual aids, 6. Construction, and 7. Field trips.

The methods used will vary with the phases of science taught because they are not all as applicable to one element of the physical environment as to another. For example, when teaching a unit on rocks or soil, one has an excellent opportunity to use the experiment and demonstration method.

Methods will also vary according to the skills and development of the children, and to the differences in the local environment.

EXPERIMENTS AND DEMONSTRATIONS

The following experiments and demonstrations are suggested. They may be altered or combined. Some of these exercises are easy enough for the slowest pupils while others are advanced enough to challenge and give opportunities for the brightest ones.

Objective: To have pupils discover that some rocks are harder than others and more tightly cemented.

Take three pieces of sandstone of varying hardness. Rub each piece with the palm of the hand or thumb. Only on the poorly cemented or soft one will the grains of sand rub loose. Have the pupils collect the material or sediment that rubs off on a sheet of paper. Let them press this loosened material between their fingers and thumb and also have them rub some on their cheek. What is it? Examine the material with a magnifying glass. What do you see? Scratch the other two pieces of sandstone with a nail. From which does the sand come loose more readily? Feel this loosened material. Try to scratch a line on a piece of window glass with the hardest sandstone.

Repeat this process on specimens of limestone and shale. Test the hardness of various rocks by pounding them with a hammer.

Objective: To have pupils discover that man as well as nature can cement sediments together and that some materials make better cements than others.

Furnish pupils with clean sand. Have them mix a cup of sand, a heaping tablespoon of clay, and some water, and pour the mixture into a paper cup or container to dry. In another container, repeat process just described but substitute portland cement for the clay. In still another container, mix only water and a cup of sand. Next, mix a cup of sand, a half cup of gravel, and a heaping tablespoon of portland cement with water and place in a paper container. After the mixtures have settled, pour off any excess water. Let these materials dry for several days or a week. Now have pupils remove materials from containers and test them for hardness by rubbing with hand, scratching with nail, and hitting with a hammer. Discuss results. Explain which materials are used in the building trade.

Objective: To demonstrate that rocks may contain air, water, and petroleum.

Take a glass container approximately eight inches in diameter and twelve inches high and fill two-thirds with water. Label and weigh dry specimens of sandstone, limestone, shale and coal. Be sure specimens are of approximately the same size. After weighing, place them gently in the container of water one at a time. Make observations after each rock is placed in the jar. From which rock did the greatest number of bubbles come? Where could the air causing bubbles possibly come from? Let a pupil blow air through a straw into the water and watch the bubbles rise. If the air comes from a rock, must there not be air in some dry rocks? What makes the air come out of the rock?

Two days later, permit each pupil to remove a rock from the jar and wipe it dry. Weigh the rock. Does it weigh more than it did before it was placed in the water? Place the rock after it is wiped dry and weighed on a piece of glass. Ask a good-natured pupil to remove the shale from the jar because it will likely crumble

in his hand. Let students smell what remains of the shale. What is the odor? Shale is nothing more than dry clay or mud. Which stone gained the most weight? Have pupils observe the sandstone on glass plate. Ask the one who placed it there if he is sure he wiped the stone dry. Discuss where the water on the plate came from. After stressing that air and water are in some rocks, especially sandstone, place a piece of sandstone in a dish of crude petroleum or oil. Experiment to see if oil will go into and later come out of sandstone.

Objective: To demonstrate that some rocks are much lighter than others and will float.

Hold a piece of pumice high over a jar of water. Act as if you accidentally dropped the pumice into the water. Let the children examine the rock. Have them compare the weight of the pumice with that of another rock of the same size. Let them throw and catch a piece of pumice as if it were a ball. Discuss with them why pumice is a floating rock and could be used on a fishing line as a bobber.

Objective: To have pupils recognize common table salt in rock form.

Give pupils clean specimens of halite or rock salt. Permit them to taste the specimens. Discuss the origin and use of salt.

Objective: To acquaint children with chert or flint which was used by primitive man to start fires and to make tools and weapons.

Demonstrate how sparks can be made by striking two pieces of chert or flint, or a piece of chert and a piece of steel. Display a few stone objects such as arrowhead, hoe, needle, and fishhook and suggest that students bring in other specimens made from chert or other stone used by primitive people.

Objective: To have children discover that there are fossils in rocks and that some limestone consists chiefly of fossils and shells.

Place specimens of sandstone, limestone, and shale containing fossils on a table. Part of the limestone should be highly fossiliferous. Some of the limestones should contain crinoid stems of the sea lily so pupils can later find crinoid stems in sand. Crinoid stems found in sand are often called "Indian Beads". Show the pupils how to find fossils.

Objective: To give the pupil the thrill of identifying rocks and of applying his knowledge in a useful way.

This experiment can be made a game called "Finding an Unknown". Place specimens of limestone, sandstone, shale, coal, halite, chert, conglomerate, and concrete in the center of a table. Be sure that you have different colors of each different kind of rock, and that some are fossiliferous and others non-fossiliferous. The pupil should use any method he has learned to examine and identify the rocks.

Story Method—

THE ADVENTURES OF BLOCKY

This story is too long for one story-telling period. Moreover, in its telling, the teacher will likely add to its length by stopping to answer questions, to inquire about experiences, and to add explanations.

Blocky was a large rock high up on the side of a rocky cliff. It had been right up on the top of this steep cliff for a very long time and was only half fastened to it. It was about the size of your desk and almost square. That is why the children called the rock "Blocky".

Blocky could look down upon a large river flowing along the base of the cliff. On the other side of the river was a beautiful valley with fields and woods. For a long time Blocky had been resting here, but now it had its troubles, too. The rain dashing against its sides had washed some of it away. Wind blew against it and the wind sometimes carried dust and sand that gradually wore away part of it. The sandy wind blasts wore away the roughness and made the surface smooth.

The rain also ran into a crack that was partly separating Blocky from the rock

cliff. Sometimes the water carried soil particles with it into this opening. At other times, it was the wind that dropped dust and fine sand into this crack. Then in winter the water that ran into this opening would often freeze and expand. This expanding ice would push Blocky a little bit farther away from the cliff.

One spring, a tree seed, dropped by the wind in the crack, started to grow. The seed was covered by soil particles falling into the crack and was watered by the rain. During the day when the sun shone, Blocky became quite warm. In this way it gave warmth to the seed. The seed sprouted. Soon a young tree was growing in the crack.

As the tree grew, it sent roots deeper and deeper down into the opening. Blocky was being pushed farther and farther away from the cliff, first by the young tree's roots in summer, and then by the ice in winter. As the tree roots and ice made the crack that separated Blocky from the cliff deeper and deeper, new roots went more and more down into the opening.

One summer the water ran into the crack and trickled out near the base. Water was seeping out through the part of Blocky that held it to the cliff. The acid in the rain and the acid from the roots of the tree were helping to enlarge the crack by eating away the rock. Later a small root grew out at the base where the water had run out.

Blocky grew weaker and weaker. When the wind blew now, Blocky rocked back and forth. At any minute the rock was likely to fall. The wind also shook the tree, breaking Blocky's hold more and more.

Finally, only two inches of Blocky were fastened to the cliff. One day a storm passed through the valley. The wind shook and shook the tree. Blocky became loosened.

At last, down it went upon the rocks below! It crashed and rolled and rolled and crashed. First into one rock and then into another. Parts of Blocky were thrown in every direction. Then, Splash! Blocky —now only half its former size—landed in the river.

The storm that pushed Blocky off the cliff brought rain. The water in the river was rising. The river flowed swiftly now and Blocky rolled along with the current. The swift current rolled it along, bumping it into rock after rock larger than itself. In bumping, small pieces came off Blocky as well as from other large rocks in the river channel. Sometimes it rolled along on the solid rock floor. Blocky's corners were being knocked off. It was becoming smaller and smaller.

Sometimes when the water was not too swift, Blocky could rest a bit on the river bottom. But, just like Blocky had run into larger rocks along the course, so now smaller rocks, gravel and sand ran into it. Blocky became smaller and smaller, and rounder and rounder.

One day, after a rain storm carried Blocky still farther down the river, it suddenly found itself swept up on a pile of sand. When the river quieted down, part of Blocky was sticking out of the sand. It was not in the water.

One warm summer day along came some boys shouting. They were on the sandbar getting ready to swim in the river.

A boy shouted. "Let's get that small, round rock over there and carry it to the edge of the river. Then we can dive off the rock into the water."

The boys came over and picked it up. Now it was a round rock. Its name had been changed from "Blocky" to "Roundy."

Blocky had the same adventure that millions of other rocks go through. Running water breaks rocks so that they become smaller and smaller and rounder and rounder. Examine a piece of gravel carefully and you will see that it is really a tiny round rock. If you look at grains of sand under a magnifying glass, you will find that they are round in shape and are just smaller than gravel. Sand breaks into

smaller and smaller pieces. These pieces often get so fine that they become dust.

Short Explanation—

WHERE DO ROCKS COME FROM

A short explanation can often be used to stimulate a child into taking part in a discussion, answering a question, or covering some important concept which has not been taught by some other method of presentation. Do not let a short explanation degenerate into a lengthy lecture. The following example of a short explanation will illustrate the method the writer has in mind. Two concepts are explained; namely, (1) rocks can be seen on the surface of the earth at many places, and (2) rock is found everywhere beneath the ground.

Have you ever stubbed your toe on a rock while walking through a field or playing in a park? Have you ever stepped on a sharp rock while wading in a creek or pond? Did you ever stop to wonder where the rock came from?

Perhaps where you live there are not many rocks. Perhaps you find them only along a creek or a river. Or you may have seen rocks along roads or railroads cut through hills. Some children live where rocks are numerous. In some places you see rocks wherever you look—even in the fields. If where you live you are unable to see rocks, it is because earth is covered with a dress of soil and vegetation. The earth was all rock before it was partly covered with soil. The soil is not of the same thickness everywhere. However, if you dig through the soil deep enough, you will reach rock.

The reason you find rocks along a stream is because running water has deposited some there or has washed the soil away leaving rocks exposed. Running water wears the earth's soil thin and cuts a hole in it. Sometimes wind removes the soil and uncovers the rocks below. At other times man uncovers the rocks by removing the soil and earth with large machines. In building roads, man often cuts through the soil and through rocks.

Large areas of the earth's surface are solid rock. But, where rock does not appear at the surface of the earth, bedrock can be reached by digging or drilling into the ground.

CONSTRUCTION

Broadly speaking, construction includes anything requiring the use of hands. Three construction activities suggested for a unit on rocks are: 1. A diagram to show the relation between sediments, sedimentary rocks, and metamorphic rocks; 2. Pupil rock collections; and 3. A schoolyard rock collection or garden.

The following table will prove very helpful to the child:

Sediments	*Sedimentary Rock*	*Metamorphic Rock*
Sand	Sandstone	Quartzite
Lime	Limestone	Marble
Clay	Shale	Slate
Gravel, sand, lime, etc.	Conglomerate	Gneiss
Vegetation	Soft Coal	Hard coal

Children should be encouraged to start their own rock collections. Construction could involve the numbering of specimens, the preparation of labels, and the construction of compartments in a cardboard box to hold the best individual specimens.

Large rock specimens which are too bulky and heavy for a child's own collection might well be placed in a corner of a large schoolyard or along the wall or corner of the school building. These larger specimens often exemplify concepts which smaller specimens cannot portray. Later, if the collection is large enough and it seems advisable, a rock garden or wall could be made. Such a structure would have both educational and decorative value.

FIELD TRIPS

Field trips, by all means, should be taken if possible. The distribution of rocks

in the community, the characteristic exposure of bedrock, the utility or handicaps of local rocks, and other concepts can only be adequately portrayed in the field. The field trip may prove the best method for stimulating a pupil in starting a rock collection and in aiding him in carrying it through.

CONCLUSION

The writer feels that if some of the suggested methods are used, the teacher will succeed in developing a normal curiosity in rocks, make outdoor hikes more pleasant and educational, and perhaps plant the seed of a lifelong interest and hobby.

A HELPFUL STEP IN EVALUATING ELEMENTARY SCIENCE TEACHING

JOE YOUNG WEST
State Teachers College, Towson, Maryland

SCIENCE TEACHERS are of necessity interested in the outcomes of their teaching and seek constantly to find ways of improving the quality of their work. Various means are used as checks upon their results. Representative among these are giving tests of several kinds (written, oral and performance tests), participation in school surveys to determine whether objectives are being realized, participation in curriculum reorganization programs, attending professional meetings to gain new ideas, and many others. These are valuable and have a legitimate place in the growth process of teachers.

However, one of the simplest and probably the beginning point of one of the most effective checks upon the results of teaching is often overlooked. It consists of nothing more than getting each teacher to take an introspective look into his own teaching in terms of its effect upon the children.

Several suggestions regarding the nature of this introspective procedure may prove helpful. First the teacher as a trained specialist should know his pupils better than anyone else and thus be able to note types of pupil achievement which are not revealed in other ways. Second, to achieve its purpose this introspection of his own work should be done freely by the teacher of his own accord and not imposed as a part of a supervisory program or other activity of an administrative nature. Third, the teacher should be allowed to use his findings as he sees fit in improving his own teaching. Fourth, such introspective surveys often prove valuable when they are shared on a volunteer basis in discussion groups. Finally, in actual practice the individual introspective survey is sound because it starts with the teacher—the person in the school system upon whom the responsibility for child development ultimately rests.

Elementary school science is one of the most delightful areas in which to teach. Surprisingly, and perhaps fortunately, this area has not become *set* and *formalized* to the extent that standardized tests are given as in some other subject-fields. This leaves the teacher free to experiment and provide experiences to meet the needs of the pupils without fear of criticism in the light of the results of subject-matter tests. Such tests wisely used, of course, have a place in the school program; but the most important thing, what happens to the child during the educative process, is not shown by such tests. Thus it remains for each teacher to try to evaluate the effects of his teaching upon the pupils.

That this kind of evaluation must be largely subjective is a foregone conclusion, but this need not be alarming nor looked

upon with disfavor since teaching itself is largely subjective, depending to a great extent upon the personality of the teacher. What, then are some guides for the teacher who wishes to make an analytical survey of his work? Attempting impartial answers to the following may aid to some extent in evaluating science teaching:

1. One of the psychological needs is that each individual wants to feel secure.

Am I, as a teacher, making each pupil feel secure by having a sympathetic interest in him and his ideas? Do I take time to talk to pupils outside of class about the things they have seen and done, something they have seen on a walk, what they did on a trip to the country? Do I help make interpretation of scientific phenomenon which they have observed?

Introspective questions such as these are directed toward helping the teacher sense whether he is providing the pupils with a sense of confidence in himself and security in the classroom situation.

2. Individuals must feel that they are accepted (not merely tolerated) by the group if they are to develop properly. They must feel that other pupils have respect for their ideas.

Do I plan group work so that shy or retiring children will have an opportunity and feel free to participate, thus gaining a sense of belonging? Suppose, for example, that some particular child has a deep interest and knows a good deal about rocks and minerals. Placing the child in a group where he can use this interest and knowledge to advantage often enables him to win the respect of other children.

3. Each individual needs to feel that he is contributing something worthwhile to the group. One of the sure signs of success in science teaching is the voluntary bringing to school of materials which are related to the classroom work. It gives the child a sense of doing his part and at the same time indicates a carry-over of classroom experiences into everyday life.

Do I encourage children to participate no matter how simple the idea may be or how insignificant a question may be asked? Do I show that I recognize the value of a contribution if it represents an honest attempt on the part of the child? Do I encourage children to bring to school collections of specimens which they made? Do I utilize their willingness in helping to secure materials?

4. An ideal classroom has been described as a place in which children can feel free to make mistakes without fear of censure from the teacher or ridicule from other members of the class.

Do I create an atmosphere of freedom in the classroom? Do the pupils feel free to try their own ideas in experimenting? Are science materials kept convenient so pupils may work with them before school and during other leisure time? Do I allow children to suggest new topics for study? Is the atmosphere of my classroom such that pupils feel free to express their opinion even though others may not agree with these opinions? Do I attempt to use at least parts of the *scientific method* in trying to teach the respect for ideas of others even though the individual may not accept these ideas?

5. A great difficulty encountered by all teachers is keeping the subject matter and its presentation at the proper level to insure mental growth.

Am I presenting the material so that it is upon the proper level to be understood and at the same time difficult enough to challenge thinking? Do I vary the difficulty of the material in making assignments and in other pro-

cedures so that the poorer pupils can achieve a measure of success and the better pupils put forth earnest efforts? Do I utilize a variety of current materials (newspaper reports, pictures, radio reports, and others) to care for individual interest? Do I try to discover and utilize special interests and aptitudes?

6. One of the great needs of individuals is to learn how to get along with others.

Do I use tactfully group approval or disapproval to help individuals learn to adjust themselves in social situations?

7. Teacher growth and a feeling of personal achievement are the outcomes of effective teaching.

Am I learning along with the children?

Obviously, these topics which have been listed are so closely interrelated that it is difficult to make clear-cut distinctions. One contributes to the other. Also, it is apparent that the objectives expressed here are being realized in other areas of school life. This is as it should be since any area of school experience has the same underlying philosophy and the various areas interact to form the total pattern of school experiences. However, it should be stressed again (1) that since science in the elementary school is highly flexible as to its materials and methods of presentation, this area is particularly useful for realizing some of the more intangible objectives which are not revealed by subject matter tests; (2) that a voluntary personal inventory of his work in this field is a valuable aid in helping a teacher evaluate the results of his teaching.

NATIONAL COUNCIL OF ELEMENTARY SCIENCE

PROGRAM

ANNUAL MEETING IN ATLANTIC CITY, N. J.

CHALFONTE-HADDON HALL

SUNDAY, MARCH 2, 1947

Breakfast—9:30–11:30 Bakewell Room.
DR. MARTIN L. ROBERTSON, President, presiding.
Business meeting.
Election of officers.

Afternoon Session

2:00–4:30 Sun Porch.
The Implications of the 46th Yearbook National Society for the Study of Education for the Elementary School.
DR. GERALD S. CRAIG, Teachers College, Columbia University, presiding.

2:00–2:30 The Place of Elementary Science in the Yearbook (Discussion based on Chapter III and Section II), Professor Victor Noll, Michigan State College.

2:30–3:00 The Purposes of Childhood Education in the Light of the Nature of the Child (Discussion based on Chapter V), Professor Ralph C. Preston, University of Pennsylvania.

3:00–3:30 The Recommendations for Teacher Education (Pre-Service and In-Service) in Elementary Science (Discussion based on Chapter X), Professor Victor Crowell, State Teachers College, Trenton, N. J.

3:30–4:30 The Implications of the Yearbook to the Elementary School. Discussion with Glenn Blough, Specialist in Elementary Education, U. S. Office of Education, as commentator.

REGIONAL MEETING IN CHICAGO

LOUIS XVI ROOM—HOTEL SHERMAN

SATURDAY, MARCH 22, 1947

Morning Session

9:30–12:30—GLENN O. BLOUGH, United States Office of Education, presiding.

9:30–10:10 *The Purposes of Science Education in the Light of the Nature of the Child.* (Discussion based on section of Chapter V of the 46th Yearbook of the National Society for the Study of Education.
DR. WILBUR L. BEAUCHAMP, University of Chicago.

10:10–11:00 *The Setting of Science in the Elementary School Curriculum.* PROFESSOR DAISY PARTON, University of Alabama.

11:00– *Panel Discussion* based on the contents of Chapter V of the Yearbook.
MISS ROSE LAMMEL, Horace Mann-Lincoln Institute of School Experimentation, Teachers College, Columbia University, presiding.
Topic: What Changes in Our Present Elementary Science Program Are Suggested by This Section of the 46th Yearbook?
Panel Members:
MISS ELIZABETH HOSKING, Supervisor of Elementary Instruction, Battle Creek, Mich.
MISS OLGA ADAMS, Laboratory School, University of Chicago.
MR. D. R. RUCKER, Curriculum Director, Springfield Public Schools, Springfield, Mo.
DR. DAVID W. RUSSELL, Avery Coonley School, Headmaster, Downers Grove, Ill.

Afternoon Session

2:00– 4:00 BERTHA M. PARKER, University of Chicago, presiding.

2:00– 2:40 *Procedures in Teaching Elementary Science.*
PROFESSOR W. C. CROXTON, State Teachers College, St. Cloud, Minn.

2:40– *Panel Discussion:*
DR. GERALD S. CRAIG, Teachers College, Columbia University, presiding.
Topic: Some of the Most Effective Methods of Instruction in Elementary Science.
Panel Members:
DR. GEORGE HAUPT, State Teachers College, Glassboro, N. J.
MISS JULIA WETHERINGTON, Division of Instructional Service, State Department of Public Instruction, Raleigh, N. C.
DR. FLETCHER WATSON, Graduate School of Education, Harvard University, Cambridge, Mass.
MR. JOHN STERNIG, Counsellor on Science and Visual Education, Glencoe Schools, Glencoe, Ill.
MISS GLADYS FORLER, Shorewood Public Schools, Shorewood, Wis.

PAST OFFICERS

National Council of Garden Teachers.
Organized February 25, 1920*—Cleveland.
President: John L. Randall, State Teachers College, Fitchburg, Mass.
Vice-President: Theodosia Hadley, Western Normal School, Kalamazoo, Mich.
Secretary-Treasurer: John A. Hollinger, Pittsburgh, Pa.
Atlantic City: February 28, 1921.
Same officers as for preceding year.

National Council of Nature Study and Gardening, Chicago—February 28, 1922.
President: Clarence M. Weed, State Normal School, Lowell, Mass.
First Vice-President: Mary H. Grosvenor,† Detroit, Mich.
Second Vice-President: Ellen Eddy Shaw, Brooklyn, N. Y.
Secretary-Treasurer: Frank R. Morey, Swarthmore, Pa.

Supervisors of Nature Study and Gardening, Cleveland—February 24, 1923.
President: Lester S. Ivens, State Normal School, Kent, O.
First Vice-President: Frank R. Morey, Swarthmore, Pa.
Second Vice-President: Lenore Conover,† Detroit, Mich.
Secretary-Treasurer: Alice Jean Patterson,† Illinois State Normal University, Normal, Ill.
Chicago: February 21, 1924.
Same officers as for preceding year.
Cincinnati: February 21, 1925.
President: Alice Jean Patterson,† Illinois State Normal University, Normal, Ill.
First Vice-President: John A. Hollinger, Pittsburgh, Pa.
Second Vice-President: Cyril Stebbins, Chico, Calif.
Secretary-Treasurer: Frank R. Morey, Swarthmore, Pa.

* Date is that of official meeting and program.
† Deceased.

National Council of Supervisors of Nature Study and Gardening, Washington—February 20, 1926.
President: Alice Jean Patterson,† Illinois State Normal University, Normal, Ill.
First Vice-President, John A. Hollinger, Pittsburgh, Pa.
Second Vice-President: Cyril Stebbins, Chico, Calif.
Secretary-Treasurer: Eldon D. Adams,† Elyria, O.
Dallas: February 26, 1927.
President: John A. Hollinger, Pittsburgh, Pa.
Vice-President: E. Laurence Palmer, Cornell University, Ithaca, N. Y.
Secretary-Treasurer: Eldon D. Adams,† Elyria, O.
Boston: February 25, 1928.
President: E. Laurence Palmer, Cornell University, Ithaca, N. Y.
Secretary-Treasurer: Hanor A. Webb, George Peabody College for Teachers, Nashville, Tenn.

Cleveland: February 23, 1929.
President: Theodosia Hadley, Western Normal School, Kalamazoo, Mich.
Vice-President: Elliot R. Downing,† University of Chicago, Chicago, Ill.
Secretary-Treasurer: Ellis C. Persing, Western Reserve University, Cleveland, O.
Atlantic City: February 22, 1930.
President: Lillian Hethershaw, Drake University, Des Moines, Iowa.
Secretary-Treasurer: LaVerne Argabright, Kalamazoo, Mich.
Detroit: February 21, 1931.
President: Gerald S. Craig, Teachers College, Columbia University, New York, N. Y.
Vice-President: James M. McArthur, New Orleans, La.
Secretary-Treasurer: Helen Dolman, Michigan State Normal College, Ypsilanti, Mich.

National Council of Supervisors of Elementary Science, Washington—February 20, 1932.
President: Ellis C. Persing, Western Reserve University, Cleveland, O.
Vice-President: Florence G. Billig, Wayne University, Detroit, Mich.
Secretary-Treasurer: Leona Sundquist, State Normal School, Bellingham, Wash.
Minneapolis: February 25, 1933.
President: Lois Meier Shoemaker, State Teachers College, Trenton, N. J.
Vice-President: R. F. Lund, State Director of Elementary Science, Hartford, Conn.
Secretary-Treasurer: W. W. McSpadden, Supervisor of Science, Austin, Tex.
Cleveland: February 24, 1934.
President: Florence G. Billig, Wayne University, Detroit, Mich.
Vice-President: Walter G. Whitman, State Teachers College, Salem, Mass.
Secretary-Treasurer: W. W. McSpadden, Austin, Tex.
Atlantic City: February 23, 1935.
President: Walter G. Whitman, State Teachers College, Salem, Mass.
Vice-President: W. W. McSpadden, Austin, Tex.
Secretary-Treasurer: Helen Dolman, Michigan State Normal College, Ypsilanti, Mich.
St. Louis: 1936.
President: Bertha M. Parker, College of Education, University of Chicago, Chicago, Ill.
Vice-President: Helen Dolman, Michigan State Normal College, Ypsilanti, Mich.
Secretary-Treasurer: Harry A. Cunningham, Kent State College, Kent, O.
New Orleans: 1937.
President: Helen Dolman, Michigan State Normal School, Ypsilanti, Mich.
Vice President: C. Thiele, Detroit, Mich.
Secretary-Treasurer: Harry A. Cunningham, Kent State College, Kent,O.
Philadelphia: 1938.
President: C. L. Thiele, Detroit, Mich.
Vice-President: Harry A. Cunningham, Kent State University, Kent, O.
Secretary-Treasurer: Mildred Fahy, Chicago, Ill.
Cleveland: 1939.
President: Harry A. Cunningham, Kent State University, Kent, O.
Vice-President: Mildred Fahy, Chicago, Ill.
Secretary-Treasurer: Jennie M. Hall, Adviser in Science, Minneapolis, Minn.
St. Louis: 1940.
President: Mildred Fahy, Chicago, Ill.
Vice-President: Francis D. Curtis, University of Michigan, Ann Arbor, Mich.
Secretary-Treasurer: Jennie Hall, Adviser in Science, Minneapolis, Minn.
Atlantic City: 1941.
President: Jennie Hall, Adviser in Science, Minneapolis, Minn.
Vice-President: Francis D. Curtis, University of Michigan, Ann Arbor, Mich.
Secretary-Treasurer: Martin L. Robertson, New York University, New York, N. Y.
San Francisco: 1942.
President: Francis D. Curtis, University of Michigan, Ann Arbor, Mich.
Vice-President: Martin L. Robertson, New York University, New York, N. Y.
Secretary-Treasurer: Rose Lammel, University School, Ohio State University, Columbus, O.
No meetings 1943–1946.
Atlantic City: March 2, 1947.
President: Martin L. Robertson, Associate Editor, The Macmillan Company, New York, N. Y.
Vice-President: George Haupt, State Teachers College, Glassboro, N. J.
Secretary-Treasurer: Rose Lammel, Teachers College, Columbia University, New York, N. Y.

IMPLICATIONS OF THE TRAINING PROGRAM OF THE ARMED FORCES FOR CIVILIAN EDUCATION *

RALEIGH SCHORLING
University of Michigan

DURING the summer of 1945 a group of twenty-six graduate Education students of the University of Michigan made a field study of some of the schools of the Armed Forces. Most of the members of the groups visited all the places, but a few did not. Among the seventeen Armed Forces installations visited were those near Boston, Newport, New London, New York, Monmouth, Philadelphia, Washington, Aberdeen, Bainbridge, Belvoir, Camp Lee, Camp Perry, and two installations in Georgia. The purpose of the group was to make a study of curriculum, materials, methods, and procedures used in the schools of the Armed Forces for the purpose of interpretating this experience in terms of constructive benefit to civilian education.

The report will be read with more meaning if we first consider five questions (Only four included in this condensation):

1. Did the Army and Navy do a good job in the training program?

It was not our mission to evaluate what was going on. We visited the training schools to see what we could learn for the improvement of civilian education. However, if we had to evaluate the program, we would keep in mind three things. (1) The job was enormous. In 44 months more than 12,000,000 men had to learn something in a hurry in one or more of the training schools. (2) Many of the jobs were technical, as for example flight engineering, radar, and a whole cluster of jobs in the field of electronics. (3) There was the constant pressure of time. If these three factors of size, difficulty, and time are kept in mind, history, we think, will record the fact that both the Navy and the Army did an amazingly good job of training.

However, not everything was perfect. We could devote much space in this report to deficiencies. For example, we could mention obsolete technical manuals, ineffective methods, and indefensible procedures employed in the schools of the Armed Forces. Indeed, one might even question whether the set up for training is appropriate to its mission.

2. Can civilian education learn from the military programs?

In a very real sense the training program of the schools in the Armed Forces constitutes a vast experimental school in pedagogy. The Army and Navy have had practically unlimited sums of money to test out materials and methods under more nearly controlled conditions than has ever been possible in civilian education. Too often in civilian education the findings of an experiment testing the superiority of one method over another are far from convincing. In contrast, controlled experimentation in the schools of the Armed Forces has in numerous situations demonstrated by completely convincing evidence that a new method may be more effective than some other method long widely used. A clear illustration is provided by the learning aid used in the training of flight engineers by which it is conclusively demonstrated that about forty hours of training on the ground and one in the air is not only equivalent to sixty hours of training in the air, but avoids the tragic loss of men and the costly crack-up of valuable planes.

* Condensed from *Swords Into Ploughshares* by the consent of the author.

The Army and Navy have had adequate personnel for teaching, supervising, and constructing materials. They have a better set of conditions for inservice education of teachers than we shall see in our times in civilian education. They have been able to select the human material for specialized programs; they have been free to design numerous short courses unhampered by academic requirements; they have had complete control of the student's time; they have been able to collect and distribute on a world-wide scale the evaluation of many of their practices; they have been able to control both the philosophy and method.

We met many instructors who had been teachers in civilian schools. Often we asked the question, "Do you think you are today a better teacher than when you entered the service?" We also asked this question in three conferences. We found not one instructor who did not express the conviction that he is now a more effective teacher. The most common reasons given were:

A. *I have time to prepare.*

In several large schools the instructor has at least one hour to prepare for each hour of teaching. A common load is fifteen hours of teaching and fifteen hours of preparation a week. Important, too, is the fact that an instructor in a training school taught his classes and that is *all* he did. He didn't have to supervise student activities or engage in community projects. Granted that it is extremely important and surely necessary for some members of the staff of a civilian school to do these many tasks, it is nevertheless impossible for a teacher to maintain a high level of efficiency if at the same time he is expected to be a social worker, an athletic coach, and a guidance official.

B. *I have small classes.*

No one knows the average class size of the total program, but it is very small indeed when compared to civilian education. For example, in the whole program for teaching illiterates in the Army, it is about twelve students per teacher. We found one technical school providing classes in forty-two large buildings for which the ratio was 3.7 students per teacher and when the supervisors were counted it was 2.7. In another school the ratio was so small that we amazed the supervisor by asking him whether school was in session. We found some large classes especially in demonstrations in certain types of work. However, these usually had several assistant instructors or they were broken into small groups by "county fair", pupil-coach, or performance test techniques and taught by student leaders. Probably it will never be challenged if we say that the average class size in the military schools is less than half of that in civilian schools in our metropolitan areas. Most classes fall in the range of six to fifteen students.

C. *I have an abundance of good materials—especially excellent learning aids with which to provide realism.*

The laboratory equipment of our finest schools, as for example Fordson Senior High School, is a grain of sand to a bucketful when contrasted to the equipment of the training schools observed in this study. Classrooms look intriguing even when there are no students in the room. The finest class-room seen on the whole trip was the one for topography—a fairy land in three dimensions constructed to scale.

D. *I am supervised almost constantly.*

Supervision seems to be less stigmatized in the military program, probably for two reasons: (a) the concept of supervision is different—its main purpose is to help the instructor plan and to provide him with vivid materials; and (b) it is given in adequate amounts rather than an occasional brief visit, inspectional in character. We found one school that provided one hour

of supervision for every four hours taught, not counting special supervision from the curriculum unit, training aids, instructor training, head of department, commandant, and representatives from headquarters. One small school with eighty-five instructors has ten full-time supervisors whose only responsibility is to supervise instruction. Again it is unlikely that any one will ever know how many times as much supervision is provided as in civilian education, but a conservative guess in our judgment is at least ten times as much.

E. *I am now conscious of the great importance of method.*

The conviction on the part of high military authorities as well as the instructors that method is of crucial importance in learning is one of the curious by-products of the training program operating under the pressure of time.

3. What part has civilian education played in the training program?

On the day that we had our conference at the Arlington Annex, there were 150 commissioned officers working on the training program. Of these, 140 were teachers, administrators, or supervisors in civilian life.

As regards the Army we can do no better than to quote a statement that General Edwards, Assistant Chief of Staff, made to us: "You have also helped us by being actually a part of us. What I mean is that the Army is full of individuals who were teachers or educational administrators in civilian life. Some of these hold straight out training assignments—planning and supervising training, instructing in schools, preparing manuals and textbooks, and inspecting the results of the training program. Others are in a great variety of assignments that are not primarily concerned with training. But, as I said at the outset, there is a little of training or being trained in almost every position in the Army. The thousands of former educators who are scattered throughout the military establishment have made themselves felt, I assure you. I don't know how we could have made it without them." [1]

Wherever we found a vigorous resourceful staff of instructors and supervisors, we found a group that included a high fraction of men who had taught in civilian life, and in eight cases at least, individuals who in our judgment have the promise of becoming outstanding leaders of education in the post-war years. Herculean tasks were carried by Col. Francis Spaulding and Comdr. Alvin Eurich. Of the many civilians who made outstanding contributions we probably should mention Dean Joseph W. Barker of Columbia University. It is clear that professional education has a great record in World War II.

But you are probably thinking, "How about the unknown teachers who taught these youngsters and who may have stayed at their desks?" Again we quote from General Edwards: "The Army builds, after all, upon the civilian education of its soldiers. Most basic habits, and the whole learning process, are in the possession of these young men before we get them. The better the educational foundation, the faster and more soundly we have been able to build the specialties we have needed." A distinguished officer who compared young men in a large unit that he commanded in this war with a similar unit that he led in the first World War, assured us that the group in the present war was much superior.

In all probability there has been a sharp shift in opinion. In the early days, reckless speakers in uniform at teacher conventions may have made unjustified claims of superiority for the military training program and voiced excessive criticism of civilian schools. Some of these statements found their way into newspapers and magazines. With the lone exception of Admiral Nimitz's drastic indictments of

[1] Record of the conference at the Pentagon Bldg., Washington, D. C., filed in the library of the School of Education, Ann Arbor, Mich.

the teaching of mathematics, such opinions were never expressed by those in key positions in the training program.

In the early days of the war our secondary schools were providing the training program with a very large number of high school graduates of whom a few per hundred at least were extraordinarily good. This gave the military schools a tremendous number of boys who could learn things in a hurry. It was perhaps natural for some of the instructors to be deluded into thinking that they were achieving miracles overnight. When they had to reach deeper into the barrel, even attempting to make good combat men out of the more competent illiterates, they soon discovered that it is an extremely hard task to teach even a few simple tasks to all the children of all the people. At any rate, there is now a very wholesome regard among military authorities for the American school teacher.

The youngsters fought and won this war and they have done a grand job. The official opinion today, in both the Army and Navy, is that the teachers who taught them before they entered the military service have also done an excellent job. Our schools, of course, can be immeasurably improved but there is no reason why anyone should feel that he needs to defend civilian education. The record is now clear and altogether convincing.

4. Is there a GI Method?

Our answer is both No and Yes. No, in the sense that there is little in the training program which has not been advocated time and again in professional literature and practiced by teachers and administrators in civilian schools in one place or another.

The answer is Yes, in the sense that there is a general pattern of method which is official in the Army and widely practiced by instructors in both the Army and Navy. In general, it is the Herbartian method of the long ago with some very important modifications. What are the essential features?

The first step is *preparation*. In the Herbartian pattern preparation referred to what the teacher did to prepare the mind of the pupil for the new subject matter. In the training program preparation refers to what the teacher does in the hour or more in which he plans the details of the hour's instruction.

The second step of the lesson is *presentation*. The techniques may include a brief lecture or talk, demonstration, illustration, conference, discussion, etc. It is unique in that the instructor proceeds to provide experiences or subject matter to achieve specific goals in much the same definite manner that a flight engineer performs his mission. He knows where he is going and he knows what he is going to do when he gets there. Finally, the presentation step is unique in that it represents a conscious effort to utilize sense experiences through a learning aid especially designed to make the learning of a specific thing easier and more effective.

The third step is *application*. It may involve demonstration and certainly drill in practical work simulating conditions on ship or in the field. The key phrase is "learning by doing," and the techniques in addition to individual student performance and group performance often include coach-and-pupil method.

The fourth step is *testing* or *evaluation* by performance test, paper and pencil test, or "county fair" techniques.

The fifth step is *review* and *critique*. The main purpose is to clarify all remaining questions through conferences, review sessions, questions and answers, demonstration of right and wrong procedures, and to devote a brief part of the hour in which instructor and pupils point out what is wrong and what is right.

We have suggested earlier that there is a deep and widespread interest in method not only among instructors but also on the

part of the general staff officers. The reason is not hard to see. From the moment of induction to the moment of combat, learning or teaching is the main job of just about everyone in uniform. The vast program includes every subject that you could list from cooking and truck driving to electronics and many others that would never occur to you. The students range from illiterates to neural surgeons. There are hundreds of training centers, some with more students than our largest universities. Hundreds of thousands of officers and non-commissioned officers are responsible for teaching so as to achieve specific objectives in the shortest time and under the driving pressure for thoroughness. The Army and Navy had no serious problem in finding teachers who knew radar, sonar, navigation, and the like. Rather they struck their real difficulty when they had to find enough men who could teach these subjects thoroughly in a fraction of the time commonly devoted to them. The ever present question is, "What is the best way to teach this particular thing?" So it has come about that there is today an amazing interest in methodology. Not since the days when normal schools mushroomed have so many persons been so conscious of methodology. In a sense the dream of Horace Mann has come true.

Two additional features identify the GI Method. In the first place the gap between pedagogical theory and classroom practice is small. The administrator of a civilian school may use all the key phrases of progressive education and yet operate a school hopelessly out of date as regards philosophy and techniques, and limited to obsolete textbooks and an outmoded course of study. That doesn't happen in a training school. Good or bad, the method described in the preceding paragraph *exists* in classrooms. The teachers have time to plan and the supervisor not only sees to it that he plans but sits down with him and helps him plan. Moreover, he visits from forty to sixty per cent of the class-hours and makes certain that the instructor at least tries to carry out the plan.

In the second place, the method assumes that learning is most effective when it stems from sense experiences and therefore is best implemented by a wealth of training aids including audio-visual. Again this is not mere theory. We saw it in action in every training school and in every class.

In conclusion, there seems to be no good reason why one should not speak of a GI Method. It is at least as sharply defined and certainly more widely practiced than was ever true in the case of the project method, the Dalton Plan, the contract method, the child-centered school, or any other method or theory that spasmodically intrigued the imagination of teachers. Nor should this method be cast aside as hopelessly conservative. We saw plenty of purposeful activity, much of it undesirable in a world at peace. We saw individualized instruction, more and better than in civilian schools. We saw realism in the classrooms, many times as much as one commonly finds. In brief, the method encompasses a number of concepts that have been identified with progressive education.

A great deal of publicity has been given the GI Method and its potentialities for solving some of our most acute educational problems. It is true that a tremendously effective job in training has been accomplished in a very short time. Courses have been streamlined and geared to job analyses, programs have been accelerated, learning has been speeded up. Yet there is as everyone knows a fundamental difference between the objectives of civilian education and military training. The one, by necessity, is geared to war and victory. The other, by obligation, is geared to peace and citizenship. With this basic difference in the objectives of the two programs, there is nothing in the picture that suggests

the need for the total or even partial reorganization of civilian education along GI lines.

A NEW PROGRAM FOR LEARNING AIDS

A single building in Washington houses $200,000,000 worth of special devices designed for the improvement of learning. This sum is about twice the total plant assets of the seventy colleges, universities, and county normals in Michigan. Witness the fact that the plant assets of the University of Michigan, which has accumulated grounds, buildings, and equipment bit by bit for more than a century, total only $62,500,000. The Army Air Forces alone used more than 2200 training aids.

It was natural that the Army and Navy should go all out for the training aids, for the use of the senses is the foundation of the method used by the Armed Forces in the training program. Whatever the historian may say about the schools of the Armed Forces, they have convincingly demonstrated the very great possibilities of more effective learning by the use of training aids, usually spoken of as learning aids or instructional aids.

Let us be clear on one point. Training aids as used in the Armed Forces mean a great deal besides something on a screen. It is estimated that the armed services have since 1940 created six times the quantity of audio-visual aids provided for use in civilian education in all the time before World War II. Nevertheless, training aids include many other devices for which the figures as regards utilization are equally fantastic.

The basic assumption underlying training aids is that learning—clear understanding—stems from sense experiences. The pedagogical guide is: Whatever is to be mastered should be learned in its natural setting, or in a situation that is staged as close to the real situation as possible.

By way of illustration, suppose you had to teach a group of men damage control. You are to teach the men the information, attitudes, and skills needed to repair the damage done to a ship by the enemy, storm, fire, etc. What would you do? You probably answer, "I'd get or write a scholarly book on damage control and require the men to master it; I'd show them a sound film; and I'd show them a slide film for each problem." All these are training aids. However, we believe we saw a more effective one to be described presently. We say more effective, for it would be hazardous to predict what a group of men trained in the fashion that has been suggested would do when they meet the real situation. Do not forget that even in so definite subject as mathematics a student may have a fairly good grasp of the basic ideas and principles and yet not know what to do with a practical application.

One of the striking features of the GI Method is the wide use of a great variety of training aids which provide realistic learning situations. These include: (1) films (movies and slide films—both sound and silent); (2) two-dimensional graphic devices (photographs, posters, cartoons, diagrams, scale drawings, graphs, maps, charts, graphic portfolios, etc.); (3) three-dimensional objects (models, mock-ups,[1] sand tables, dioramas, terrain models, real objects, etc.); (4) auditory aids (phonograph records, devices simulating sound, etc.); (5) special devices (mock-up of a pilot's compartment, Link Trainer, model topography classroom, miniature planetarium, globe with blackboard surfaces, pinball machine, etc.); (6) printed materials (books, manuals, bulletins, pamphlets, periodicals, etc.).

It will be difficult for civilian educators, who have not seen the training programs, to appreciate the range, number, variety,

[1] The Army Air Forces defined a mock-up as "a mechanic object or device used as an aid in teaching."

and effectiveness of the learning aids employed in the school of the Armed Forces. Our study group visited hundreds of classrooms and without exception they were serviced with a wealth of instructional aids —in most cases highly appropriate to specific objectives.

The classrooms looked very different from our academic classrooms. Roughly one might say that the principle underlying the settings of good first-grade activities has been utilized for adult education purposes. For example, what would a good first-grade teacher have in her room if she wanted the children to do a good job in reading and talking about rabbits? The obvious answer is a couple of rabbits. Most teachers will perhaps admit that too often our rooms lack equipment—that they are so barren as to suggest mere detention or custodial care of children. Then, too, many schools operate on the assumption that a subject in high school can be taught in any vacant room. The Army and Navy have changed that by providing films and gadgets and by covering the walls of classrooms with posters, cartoons, etc., all of which drive home the main ideas of the unit that is being taught. They had the "rabbits" in every classroom.

So far as we could learn, both the Army and Navy developed their training aids programs that are so strikingly similar without much cooperative planning. If this is true it is significant, for it would suggest that each was forced under the pressure of time to find more effective ways to teach the things that had to be taught.

We Need to Make Greater Use of Sense Experiences When Staging Learning Situations.

We believe that this area, if intelligently cultivated in the years ahead, might yield a real improvement in our schools. It could happen that any city, state, or teacher education institution which neglects this problem may find itself outmoded ten years hence. However, before we go all out for a program in learning aids, we should recognize that we can go off the deep end in many places. Here, for example, are some common ideas about learning aids that may need to be modified or even discarded before a sensible program can be provided.

PHONY IDEAS	REFUTATION
1. When you do find a good film you should dismiss a lot of classes in order that all the students may see it.	1. We might call this the shotgun technique. Since you have a good gun it seems reasonable that you will hit something if you scatter over a wide area. The whole school on exceptional occasions may, of course, need to see a film. But in general, a film needs to be geared to a specific objective in a unit of instruction.
2. Training aids, as used by the military, are limited to the teaching of science and the arts, and, therefore, they are of no great interest to teachers of other subjects.	2. The Army used training aids with great success in teaching attitudes, as for example, morale and the traits of a good soldier. Learning aids should prove to be especially useful in the social studies, in fixing the dispositions that make for good citizenship.
3. The phrase, learning aids, refers largely to sound films.	3. As has been suggested, sound films, while used in fantastic numbers, are nevertheless a small part of the total picture of training aids.
4. The way to make a big improvement in the existing program of visual aids in the school system is to secure a lot of surplus property.	4. Much of this will have no useful purpose in our schools. The task of judicious selection will be very difficult, and in many cases the teacher will not know how to use some of the materials.

PHONY IDEAS	REFUTATION
5. We can take over the training aids of the military without a research program.	5. A good training aid is one that stems from a classroom need and which has been tested to see if it is better than any other known device. Before an aid is released for wide use it should have the "bugs" taken out of it. We did not find instructors who believe that the training aids program could have succeeded without careful testing of individual aids. They believe that they would have been overwhelmed by much useless material.
6. Learning aids are useful mainly in teaching skills and in giving information.	6. As has been suggested above, they may prove equally useful in teaching attitudes. We saw schools in which specific attitudes and dispositions—those related to good housekeeping, morale, discipline—were driven home by visual aid techniques that are illustrated in civilian life by certain aspects of bond drives and advertising campaigns.
7. A learning aid is an end in itself.	7. This fallacy is perhaps obvious and yet we saw at least a few instructors in action who had lost sight of the fact that a learning aid is only a means to an end.
8. A city like Detroit should develop a department of audio-visual aids separate from the curriculum.	8. There is no justification for a learning aid that does not implement some objective of the curriculum. In efficient administration the program will be subordinate to the curriculum.
9. A learning aid is a substitute for a teacher.	9. To an extent that our study group did not realize, a good program of learning aids increases the importance and responsibilities of a teacher. In common practice a teacher may perhaps take his class to see a film and seize the opportunity to relax or even take a nap. When properly used a learning aid frees the teacher for his task of guiding the learning process.
10. The teachers of the various school subjects have little to contribute to a program in learning aids.	10. In a good program many valuable ideas will come from classroom teachers. Moreover, teachers, especially those in industrial and fine arts, will produce many of the aids observed in our study, when they realize the possibilities, and provided that they are given the materials and the time.
11. The supervision of a program in learning aids is an extra job on top of a full teaching load and not unlike the sponsorship of an extra-curricular activity.	11. We found one school of about 100 teachers that had five full-time teachers of training aids. Moreover, they had the training aids of the whole Navy to draw upon without cost entering into the picture. It is inconceivable that a teacher or even a committee on full-time teaching could guide a program of consequence in a large school, not to mention a city system.
12. With proper guidance the staff can do all that the Army and Navy have done with training aids at very little cost.	12. As has already been implied, some things can be done without much cost, but a really fine program will cost money—lots of it.
13. Learning aids amount to a passing fad—all we need to do is ignore the present emphasis and to wait it out.	13. We shall always have persons who have difficulty grasping ideas. Competent teachers will always be aware of this fact and they will try to do what they can to provide vivid illustrations. A good school will see to it that learning is not unnecessarily difficult.

PHONY IDEAS	REFUTATION
14. All we need to do to solve the problem of learning aids is to get the Legislature to appropriate one or two million dollars to buy visual aids.	14. At least one state has passed such an act and in the surge of interest for visual aids others may follow. A considerable fraction of such sums may be frittered away by the numerous districts in buying visual aids that will not fit specific units in the curriculum, and in a short time the materials may be stored on shelves—provided there are shelves.
15. The problem will be solved if enough teachers take professional courses in visual aids.	15. No doubt such courses are helpful but they are not sufficient to create and maintain a vital program in visual aids.

The faculty of a school should have a standing committee on audio-visual aids.

The numerous services that a standing committee on visual aids can render to a faculty are perhaps obvious. At any rate, only a few will be listed here.

1. Avoid undesirable duplication. A Michigan school recently showed a movie on the use of the micrometer to the same students three times in one day.

2. Provide teachers from time to time with a brief list of really useful materials. There are not as many valuable movies and slide films as the catalogues suggest. Obviously useful material that is free or which can be obtained at low cost should be featured in such a list.

3. Guide the faculty in the careful selection of surplus war property. On our tour much material was recommended with excessive enthusiasm. In many aids the ideas were very good but there seemed to be no realization that they would need to be greatly modified to be of use in civilian schools.

4. Help the classroom teachers to manage visual aids. Our study suggested many possibilities. For example, we saw an inexpensive bulletin board of about 800 square feet in the form of a book. It was substantial, very light, and could be readily moved to any spot in the room.

5. Improve the ways that teachers use visual aids. Although many teachers make good use of visual aids it is also clear that much which is now done in the name of visual aids is a waste of time and money. As has been suggested, a good film strip should be built into a unit to achieve a specific objective. In common practice many movies and film strips are shown without even a preview. The movie in far too many cases is the resort of a lazy, tired, unprepared, or overworked teacher. In brief, there is much to remedy.

6. Exercise a caretaker function of the visual aids now possessed by the schools. If there is not a central place in the building for aids used by more than one department, the equipment tends to be lost and new teachers especially may not learn for a long time that it exists.

A standing committee, such as is here suggested, might as well use at least one faculty meeting early in each semester to discuss its continuous survey and its recommendations relating to proper utilization of visual aids.

A PROGRAM FOR PHYSICAL FITNESS

1. Schools should set aside adequate time in the school day in order that the goals of physical fitness may be achieved.

2. The program in physical fitness must be unified, broadly conceived, and implemented by a staff that understands the total program.

3. Communities should put forth strenuous efforts to provide adequate facilities.

4. Schools must build the proper attitude toward physical fitness.

5. The program should be administered with great flexibility.

6. A school should keep cumulative records of health and progress toward physical fitness.

7. The facilities for physical fitness should be available to all citizens of the communities.

A MORE EFFECTIVE PROGRAM IN GUIDANCE

A more effective program in guidance would seek to avoid the drastic waste of human resources. This would mean that:

Schools need a more comprehensive accumulating record of each pupil. As Lt. Comdr. Guy L. Bond vigorously pointed out, we do not know enough about the students that we teach. In all probability, a hospital knows more about a patient at the end of a week than a typical school knows about a student who has been enrolled a year or even four years. One cannot teach a student that he doesn't know. Of course the best source of information for guidance purposes is the student himself. However, there are factual data not easily obtained by every teacher which often explain why a pupil thinks, feels, and acts as he does. Certainly it is wasteful of time and effort for each teacher to have to discover these facts for himself. Often one teacher knows a fact about a pupil that could be used as an approach by his other teachers if only they knew it. Such facts should be made available in the permanent record.

1. We must see to it that the permanent record of a pupil is used.

2. We must make wider use of tests.

3. We must provide an opportunity for each pupil to receive personal counseling.

4. A school large enough to afford it should include on its staff at least one member who is professionally trained in guidance procedures.

5. In each of the larger cities we need to create a department of research.

6. We can do far more than we do in orientation.

7. The guidance program must follow up the drop-outs and the graduates.

A MORE INTERESTING AND CHALLENGING SCHOOL DAY

Most children like to go to school. The conventional cartoonist who invariably pictures the opening of school as a despised event is not on the beam. However, schools have many dissatisfied customers. Far too many out of school youths look back upon their school days as insufferably boring.

Schools should make a special effort to make the school day more exciting.

We are not going to be drawn into the age-old debate of "sugar coating versus iron" in the curriculum. We have in mind situations in which students did the hardest kind of work throughout long strenuous days. There is no conflict between interest and effort. Rather the two go together when the situation is managed right. Our question is, how did the instructors achieve this commendable spirit of industry?

Five factors have been adequately discussed in earlier sections and therefore need only to be listed here with a brief comment for each.

1. *Specific objectives.* With few exceptions the instructor and his students knew exactly what was to be learned in the hour. Then, too, the training program classified its objectives as follows: (1) the things the student must learn, (2) the things that he ought to learn, and (3) the things that it would be good to know. We interrupt the discussion here to point out that the service schools taught all of the first, some of the second, and none of the third. In civilian schools we have to teach all three. This is one of the minor differences between civilian and service schools.

Let us get back to the problem of motivation. We believe that this definiteness of goals makes for interest, cuts down dis-

taste for school subjects, gives direction to learning, and helps to solve the problem of the crowded curriculum. The main reason why the curriculum bucket is always running over is that we do not have specific objectives—not even the "must know" for our courses. Far too often no one in our classrooms knows what is to be achieved. We can think of no better way to make a substantial improvement in our schools than for teachers to provide pupils and parents with at least a rough list of the things to be mastered in each unit or course.

2. *Better planning.* We have pointed out earlier that the instructor in the military school had at least one hour of planning for each hour of teaching, and more important, he was given lots of help in planning by the supervisor. In the training schools, so very much has to be mastered in so short a time. The stock joke is that if you sneeze you miss the tangent of an angle. Therefore, planning is of the utmost importance. It was gratifying to find in some schools officers with the title, "In Charge of Lesson Plans." The right kind of planning gets results for it enables the events of the hour to move on schedule, guarantees variety, and avoids exceeding the span of attention to a single type of mental experience. In far too many civilian schools, teachers and books change every year without a respectable course of study, without supervision, and with no provision for the right kind of planning.

3. *Selection of students with special aptitudes for the task to be learned.* It is not difficult to interest a student in that for which he has a native flair. Long ago a great teacher, Colvin, said, "We must stop teaching people what they cannot learn." We have many pupils studying algebra and geometry who can never be interested except by excessive cost of time and effort. Such students might well be guided to more appropriate mathematics courses. In brief, we must sooner or later do some sensible sorting and screening in terms of abilities and needs for certain things that we are trying to teach.

4. *More achievement testing.* This factor also has been covered. Suffice it to say here that if tests are used in the right way —largely for instructional purposes and to answer the pupil's question, "How am I doing?"—the pupil will like them and the school day will be more interesting.

5. *Training aids.* As was emphasized in an earlier section, the instructors in the Armed Forces had the tremendous advantage of elaborate equipment to facilitate learning. In particular we remind the reader that the training aids, as, for example, slide films, were in many cases built into the curriculum units and there was therefore some guarantee that the hour would not only be more interesting but that it would not be wasted.

There are five additional techniques that are noteworthy:

1. *Organizing a curriculum unit in terms of ability to do.* To an amazing extent the training program was geared to performance tests. In a number of classes observed the students listened to a lecture by the instructor or some student for a brief period of perhaps five minutes. The next step was a demonstration of the process. This might take twenty minutes. In the last thirty minutes of the period the class was broken up into small sub-groups. Let's assume that the process involved five skills or five categories of facts. In that event each sub-group gathered around a station in charge of a student teacher, perhaps a non-commissioned officer, who observed each student perform the skill or evaluated each student's effort to list the facts. This procedure is called the *county fair technique.* In some cases where the process taught was relatively simple the students were paired in order that they might take turns observing and criticizing each other's performance. This is called the *pupil-coach technique* and is of course not uncommon in civilian schools, especially in physical education classes.

"Learn today and use or demonstrate tomorrow" is a good pedagogical maxim but extremely difficult to apply day after day. The general suggestion is that the pupil who is unadjusted in the traditional academic course needs to be placed in a rather small world—a workroom setting—in which things need to be managed, so as to demonstrate or utilize the principles that we aim to teach him. It is the only way to keep meanings ahead of manipulation and to build for confidence by avoiding confusion and frustration. We are convinced there should be and can be more doing and less reciting in our classes.

2. *Using students as assistant teachers.* Instructors in training schools were seldom critical of civilian schools and then only mildly so. They were, however, insistent that we do not give students enough practice in leadership by having them appear before the class or before a sub-group with the responsibility for driving home some specific point of the lesson. They were firm in their convicition that far too many students came to the training schools who had never had this valuable experience in all the years spent in elementary and high schools. Moreover, they seemed sure that only a little of this type of work results in rapid growth in confidence and interest in the work. One instructor used the commendable technique of staging a short ceremony during which he inducted five especially competent students as assistant teachers for the duration of the unit. Incidentally, we were told that more often than not it is possible to find a few students with greater control of the skill or subject-matter than the instructor. We have all urged wider participation by pupils. We wonder if many of us have made good use of this very simple procedure. In any case here is a technique that should be more widely used and which is just as easy to apply in the teaching of Latin as it is in a science.

3. *Instructional materials more nearly self-teaching.* Given an excellent teacher with a small class and reasonably good laboratory equipment, good textbook materials are perhaps not so very important; but in the case of an incompetent or beginning teacher the text materials must be carefully designed. The mimeographed materials used in the training program show that in many cases the persons responsible for them have tried to keep in mind the person who is to study these materials, what he knows, and how he learns. A goodly fraction of the teaching materials employed by USAFI are labeled self-teaching. The Navy's strenuous effort to provide self-teaching materials for the enlisted man, who may find himself in a place where no teacher is available, is significant. In general, textbooks in schools are far superior to the technical manuals of the Army and Navy, but the effort to design self-teaching materials may have a worthwhile suggestion for commercial publications after the war.

4. *A larger responsibility of the student for his own education.* Too often in the typical school the disposition of the student is, "I dare you to teach me." In the schools of the Armed Forces, the attitude of the instructor is likely to be "You've got to do something about it." Perhaps we can manage things in the postwar years so that a student who wants an education will feel that he must do something about it. An increased emphasis on the guidance function and wider use of instruments for the discovery of aptitudes and abilities should tend to place the responsibility where it belongs—on the individual student. We are convinced that the school day will be more interesting if this happens.

We noted, of course, the extensive use of awards—bars, stripes, medals, citations, ranks, insignia of all kinds—in the Armed Forces to stimulate learning. To some these seemed to be effective factors in motivation. However, informal discussion suggested the sheer impossibility of our group coming to any agreement as to the basic

validity for increased development of this device in civilian education.

5. *The use of humor.* Instructors in the training schools have given much attention to the appropriate use of humor in brightening what might otherwise have been drab occasions. They systematically used humorous, vivid, even grotesque materials to dress up blocks of learning. We found humorous line drawings in many service publications even on serious and grim subjects. Grotesque cartoons were used widely on classroom walls. Training aids made extensive use of comic strips of the Walt Disney type. Wilbur Wright and Wilbur Wrong demonstrated right and wrong methods of performance. The droll antics of Recruit Snafu (Situation normal —all fouled up) who couldn't profit by his multi-sensory experiences, amused many trainees. In general, these did not detract from the seriousness of purpose in the situations that we observed.

Traditionally, the use of humor by teachers has not been encouraged. Can it be that we have taken ourselves too seriously in the classroom? All the fun and excitement should not be outside of a school. Of course humor can be distracting and inappropriate. It can miss fire with youngsters; but our observation convinces us that this need not be the case. If humor can be used effectively in the grim business of training boys for combat it should be possible for us to use more than we do now.

There were also miscellaneous techniques for which we can do no more than to make a brief listing. These included: (1) *Social pressure,* as for example "This is the best outfit" and "this is the best class". (2) *Teacher experience.* In the closing days of the war the instructor with combat experience had the edge. (3) *Connection with life outside classroom.* In military instruction facts and skills needed in combat were emphasized. In civilian life this obviously might take the form of relationship to out-of-school work experiences or adult life. (4) *Student suggestions.* Many instances were observed where instructional materials and methods were modified in terms of trainee suggestions. (5) *Small classes.* Other things being equal, pupil-teacher fellowship will be closer and interest higher when classes are not too large.

The preceding techniques will go a long way in making the school day interesting to more youngsters, but they do not strike at the fundamental cause of our troubles. The main cause of our difficulty is the curriculum, and that leads us to make three important recommendations.

1. *We should provide new and better courses for a high fraction of the high school's population whose needs are not well met in the traditional courses.* We didn't find a school for "hair do" but it wouldn't have surprised us much. Somewhere we were told that the Navy has a school for soda jerkers. The great variety of choice of short specific courses in the learning program is something that we should look at twice before we reject it. The training program confronted many boys with an elaborate intellectual cafeteria that at long last gave them an opportunity to try their hands at something for which they had a bit of special ability and interest.

As everyone knows, there are pupils—very large groups—who are unadjusted in our schools. Such pupils will never be satisfied with a purely academic program. Many of them have the ability to render valuable services with a bit of special training. Witness the fact that several hundred thousand boys held important semi-technical jobs as a result of something that they had learned after they left the regular schools. We must provide a more realistic curriculum for the large number of persons who will continue to be absorbed fairly early in life by industry, trade, farm, and business. We must give our boys greater security in practical af-

fairs. Since there are in our high schools these large groups of boys and girls whose needs cannot possibly be met by traditional courses, the sensible thing to do is to provide good courses with very different goals and experiences for groups with different needs. Furthermore, as has been suggested earlier, we must somehow do this in a manner that does not stigmatize any group.

There is here no implication that the traditional courses will be less important in the future than they have been in the past. Since the turn of the century the high school has been facing a double responsibility. It must train for leadership in science, mathematics, and the other learned fields, and it must provide a broad education in terms of effective citizenship, the home, the community, and in the state and world. It is not a question as to whether special attention shall be given to either the college preparatory group or the non-college group; both jobs must be done.

As professional workers, we must provide an adequate education for the unadjusted student, because as a human being he is entitled to it. Society dare not neglect the problem, because its institutions are forever in danger when the uneducated masses become restive by the annoying gap between the things that they can have and the things that they want.

2. *We should expand technical education.* The training schools took many of our drop-outs and unadjusted pupils and on the whole very successfully taught them a correlation of industrial arts, a simple type of physical science, and the related mathmatics. Several hundred thousand boys literally helped save our institutions by what they learned in this series of short courses, but what is more important for peacetime education they also saved themselves by attaining self-discovery and confidence.

3. *Our small high schools should expand the curriculum by correspondence courses.*

We asked the curriculum experts of the Navy to share their experience in curriculum construction with us by giving us some implication for civilian education. Their suggestions follow: (1) Each curriculum should be designed to meet a specific need; (2) A clear statement of objectives for each course in the curriculum is essential; (3) A fairly detailed outline should be prepared for each course; (4) Adequate testing techniques should be utilized to test the effectiveness of the program; (5) A continual check must be made to determine the effectiveness of the program; (6) Many curriculums should be strengthened by the addition of effective training aids; (7) The various techniques of curriculum building should be studied and developed; (8) The possibility of standardizing course content in civilian education should be reexamined, and (9) Cooperative effort in the production of text materials, might prove beneficial.

A Bill of Rights for Teachers.[1]

1. *The right to take time in the school day to plan.* The general practice in the service school of one hour for each hour of teaching seems adequate.

2. *The right to teach classes that are not too large.* Depending on the kind of work, a class size of from 10 to 20, a very common one in the training program, seems reasonable. To implement this suggestion the schools will need an additional million teachers. (In scratching our heads to find work to go around let us not overlook the possibility of keeping a million people out of trouble by utilizing them where they are sorely needed—as teachers in our schools.)

3. *The right to an adequate amount of constructive supervision.* In the training program and instructor was supervised for 40 per cent to 60 per cent of the time that

[1] Editor's note: Material listed in Bill of Rights is slightly modified to conform to later published statements.

he taught. We have no basis for suggesting the minimum that might fulfill this right but even 10 per cent would be an amount that few schools, if any, now provide. The teacher who, day after day, does a grand job finds it difficult to maintain morale and to avoid devastating frustration when no one ever comes to see his work or to discuss his plans with him. Even the pupils may not recognize his unusual excellence until years later when they have perhaps fallen victims to less competent teachers.

4. *The right to work in a room that, with the help of the students, can be made pleasant and appropriate to the tasks to be learned.* Too few rooms are suited to the subject under study.

5. *The right to teach with adequate materials,* especially with such audio-visual aids as are genuinely useful and readily available.

6. *The right to a realistic program of inservice education* geared to a competent department of research that will keep teaching materials and techniques up to date without too much grief and wasted effort.

7. *The right to a 30-hour per week load.* Leaders of labor and civil service are advocating a 30-hour week. As every one knows a teacher's work—planning, grading papers, visits to homes, etc.—can not all be left on his desk at the end of the day. No one really knows the average number of work hours per week of all teachers but it is probably much closer to 60 hours per week than it is to 30.

8. *The right to adequate compensation —52 week pay.* Salaries of teachers have risen some during the war period. But as every intelligent citizen knows the general situation is very far from one that guarantees good and zealous teachers for our schools. A single illustration will serve. Let us take the case of East Lansing which we select because as a community and a school system it is far superior to the average. A teacher with a Master's degree, after teaching fourteen years in that system, would still be about $500 below the average wage paid last year to all the piece workers in General Motors.

The average annual salary of public-school teachers, principals, supervisors, and other instructional staff for the year 1944–1945 is estimated at $1786—at least $500 less than the average earnings of workers in private industry. The teaching profession will always include an astonishing number per hundred who labor with high competence and missionary zeal for the good of the cause regardless of compensation. For that we are proud, but a million persons do not year after year give themselves to any calling without appropriate salary. What really happens is that many of our best prospects for teaching are attracted by better paying jobs in industry, business, medicine, etc. Witness the fact that in the three years preceding World War II the University of Michigan recommended for certification a total of only eight teachers in chemistry and two in physics, whereas many times this number went into industrial research. Naturally we want teachers to be paid high salaries which now are shamefully low. But our chief concern is that society is unwittingly paying a devastating penalty when it employs persons who never should teach children merely because they are cheaper than good teachers.

9. *The right to an internship.* We need to use the internship concept in teacher education. The reason why the instructor training program could be so very brief is that the beginning teacher was given a great deal of help by competent supervisors. We have already pointed out that experienced supervisors observed about half of his teaching and helped him plan his lessons in great detail. In one school he was assured that at least one full period would be observed each day. More than that it was the practice in some schools to have him observe two experienced instructors teach a lesson before he undertook to teach it. Then, too, the in-

terview following an hour of instruction was treated seriously and a record of it filed with the head of the department. In one school the beginning teacher also interviewed the head of the department once a week, using the records just mentioned as a basis. In brief, some of the schools of the Armed Forces provided an excellent program of inservice training.

All this is very different from what one finds in civilian schools. No institution of teacher education can turn out a finished product. Yet seldom is the beginning teacher given a light assignment and an adequate amount of supervision. Indeed he is lucky if he does not draw the heaviest load and the most disagreeable tasks. Is there anything that might serve as the equivalent of the inservice training provided by the Army or Navy?

The solution to our problem is the idea of internship. It has long been advocated and it is generally approved but seldom found in practice. The nature and character of the period of internship is suggested by the following provisions: (1) a light teaching load; (2) Salary appropriate to the load, ideally a living wage for a single person; (3) experience in a great variety of tasks, as, for example, extracurricular, administrative, and teaching; (4) adequate and competent supervision; (5) correlated graduate work; (6) an opportunity to study the work of teaching as a "whole" before being limited to the teaching of a single subject or grade; (7) an arrangement truly professional which guarantees that the internship concept will not be used as a means of hiring a cheap teacher to replace a more expensive but experienced teacher; (8) an opportunity for effective observations in sharp contrast to the prevailing practice in which student teachers are required to make numerous observations so early in their professional work that they cannot see very much; and (9) the use of gifted teachers with special interest in professional problems to supervise beginning teachers, allowing them time in the school day to do the job and extra compensation for this valuable and technical service.

It is extremely perplexing to account for the long delay in taking the sensible step toward the building of a sound profession for teachers. It is incidentally one of the best ways of securing good teachers for a school system in that a superintendent has a chance to see what the candidate can do on the job in his community before he needs to offer a contract, and in the appraisal he can get several judgments to support his own. To give the idea a fair trial a group of cities should undertake the plan cooperatively in order that each interne who has succeeded brilliantly may be offered a contract in some city in the cooperative group. We are convinced that the help provided for beginning instructors in the training program will not be available in our times in civilian schools unless a considerable number of schools adopt the internship plan. The medical profession would not be willing to give it up but has extended the time to four years for its more competent candidates. Why should we be unwilling to try it?

10. *The right to the same personal liberties as other respectable citizens.*

11. *The right to help modify school methods, programs, and policies.*

BETTER CITIZENS FOR OUR LAND AND FOR THE WORLD

To build and maintain morale, all competent classroom teachers should be identified and given professional recognition and merited rewards.

1. *The traits of the Good Citizen must be geared to the education of the emotions.* It is not enough for our young people to know what is right and what is wrong. Children often express very glibly what is the right thing to do and promptly proceed to do the wrong. Lots of people disobey laws that they know to be desirable. Many persons are in prison or

ought to be who know perfectly well what they should do. Our young people have to be brought to the point where they care —they must have deep loyalties. They must feel deeply enough to care about the kind of school they attend, about what happens in the community in which they live, and, of course, they must be concerned about this great country of ours and the new world that we now face.

We have made at least two mistakes in teaching citizenship. First, we have assumed that good citizenship is a by-product of teaching subject-matter areas and that we can achieve it with most of our pupils without painstaking planning and teaching. We tend to rest our case on the teaching of facts and the outcomes of reflective thinking. Then, too, we may have relied too much on precept, vitally important as this is. In the second place we have assumed that practice of the democratic way alone results in rational and desirable behavior.

The much publicized volume *Learning the Ways of Democracy* does not seem to us to assign enough importance to loyalties and feelings. We do not belittle the importance of facts and practice but we believe that something is missing when we stop here.

2. In teaching the traits of the good citizen we should along with other techniques utilize incidental teaching. We have suggested earlier the importance of an indirect approach. The Armed Forces have made great use of incidental teaching not only in building morale and discipline but also in teaching ordinary subject matter. Bulkheads, walls, and bulletin boards are covered with charts and posters. A captured Jap periscope is used at New London to give sailors a chance to compete at reading ship directions and distances. A harmless-looking portable drill at the Damage School in Philadelphia gives the person who fools with it a mild shock to remind him of one of the common principles of electricity. Corridors, entrances, and barracks provide drill devices developed from discarded pin-ball machines. The sailor or soldier can test his knowledge of plane identification or answer any set of 10 true-false or completion questions relating to the curriculum unit under way on a revamped pin-ball machine and have his grades recorded instantaneously.

In civilian education we do not make enough use of bulletin boards and posters on the walls of our classrooms and corridors to reinforce our instruction. For example, too often our school lunchrooms are merely places in which we eat, though cartoons and posters, not to mention selections of good music such as we enjoyed in some of the mess halls, might contribute to the achievement of some worthwhile goals of the school.

We saw a great deal of subtle incidental teaching in the training schools—perhaps we should call it propaganda. Youth is, of course, in general, gun-shy of preaching, but a school can do a lot of powerful preaching by comic cartoons and artistic posters. We saw these used effectively for serious and worthy objectives even in every latrine of a large school. Believe it or not those posters were not mutilated or marked.

Incidental teaching is a powerful technique. In the copper country of northern Michigan Fred and Cora Jeffers, as superintendent and principal, have been operating a school at Painesdale for over a half century in which petty thievery almost never happens. Even in depression days when about 75 per cent of the population in the large community were on WPA including first generation people from many foreign countries, the lockers in the corridors were never locked. Nowadays Mr. and Mrs. Jeffers do little talking about stealing. The tradition of not stealing has been built into the mental climate of the school and is now effectively guiding the third generation.

Of course, many civilian teachers have long used incidental teaching as a technique. But the point is that its effectiveness in teaching attitudes of good citizenship is not generally recognized by teachers; its goals are not cooperatively chosen by the staff; it is not planned with painstaking care, and is not in general followed through with high standards of thoroughness. This is what we should do.

3. *Incidental teaching of citizenship should be so managed as to guarantee the student's freedom to learn.* We hear much about freedoms these days. For example, we read about freedom of speech and a teacher's freedom to teach. Let us be equally concerned about a student's freedom to learn. When we use the techniques of propaganda we are playing with a dangerous instrument. How shall the student be protected? Probably the learner will be adequately protected if the members of the staff definitely and consciously select the objectives after full and free discussion. We must not stop there. The surest way to protect the student is to make certain that he participates freely and vigorously in selecting and achieving the goals. Since participation is one of the most effective teaching devices that we have we can kill two birds with one stone. We can fully protect the student's freedom to learn and at the same time provide a setting that is best for the normal development of the individual. We saw much regimentation and compulsion in the training schools though far less in a citizen army and navy with instructors who had themselves only a few years earlier been teachers in civilian schools than the reader might imagine. Nevertheless, we want none of it in our schools. These dear boys of ours, still in their early twenties and with only a few months training in military schools, who with sustained courage fought endless days, grew up in our democratic education institutions. They did not die to establish a regimented school!

MORE FINANCIAL SUPPORT FOR OUR SCHOOLS

The disposition of society toward the cost of educating for living in a peaceful world presents a sharp contrast with the attitude toward the expense of training for combat. It cost about $50,000 to train a pilot. We saw thousands of mechanics being trained at an annual cost per man greater than the annual salary of the industrial teacher in the home school. The general situation was dramatized for us by one experience. The story runs as follows: An instructor in one of the training schools had, in civilian life, been a teacher in a vocational school of 138 pupils in New York City. Unfortunately, he had no blackboard and his request for one was denied. He determined to make an issue of it by following the request all the way up the line in the New York school system only to have it finally denied. At the very moment that he was telling us this episode, we were watching a class working with a training aid that cost over $250,000.

Would it be a sound investment for the public to double its financial aid for schools? Our answer of course is unequivocally *yes* but unfortunately we cannot prove it. We can only rest our case on what seems to be common sense. The taxpayer spends about 14 billion dollars per year on crime and delinquency. The men and women who devote their time to the study of this problem tell us that better schools can sharply cut this waste. The taxpayer spends an equally fantastic amount per year for the care and keep of persons mentally ill. Experts in the field of mental health assert that the number of frustrated and unhappy adults, not to mention the many unadjusted youngsters in our schools, can be greatly reduced by better guidance programs and by more classrooms in our lower schools in which exist the conditions making for sound mental health. An earlier section of our report made clear the high fraction of our people

who can never enjoy a satisfying life because they are physically unfit. Better programs making for physical fitness in our schools can surely do something about this problem.

It is futile for us to suggest that the two World Wars could perhaps have been avoided if a hundred years ago the schools of all countries had invested ten times as much money as they did teaching good will and cooperation to the common people of every land, and that without these two devastating wars we could now be operating an adequate and efficient school at every crossroads in America. We cannot now improve our curricula or methods by suggesting that the $200,000,000 worth of learning aids housed in a single building in Washington is probably several times more costly than the equipment in all the psychological laboratories in our higher institutions. Futile also is it for us to use the threadbare argument that the nation spent seven billion dollars last year for liquors and less than half as much for education. There is, in fact, little that our group of administrators or indeed the whole teaching profession can do about this for the decision is a matter of public policies and values. Therefore, there is no recommendation in this section.

This much, however, is clear. Undoubtedly our chances for permanent peace are immeasurably improved by more sensible international machinery for cooperation but the new and better world that we all want will never be brought about unless we start at the grass roots and provide better schools for all the children of all the people. That will cost more money than is now provided for public education. The destiny of all mankind is at stake for the atomic bomb starts us on the last lap in the "race between education and catastrophe"!

SCHOOL ENVIRONMENT AS A STUDY OF NATURAL OUTDOOR PLAY MATERIAL FOR KINDERGARTEN CHILDREN

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During the past years, much time has been devoted to the study of the choice of play material; records have been made and curricula built upon the evidence. The following is an attempt to study the natural outdoor play material offered by our school environment, with a view toward developing the lives of kindergarten children, through their own reactions.

The Henry Barnard School in New Rochelle, N. Y., is an elementary school located in one of the residential parks of the city. The building is a modern, two-story structure made of fieldstone. It is surrounded by woodland. The trees for the most part are oak, maple, beech, birch, dogwood, and ash. A natural brook runs through the property and a small, flat section at one side, the west, has been hollowed out and leveled so the water has collected and formed a small pond. Large stones have been placed to form the banks and there are steps at either end. On the same side a steep hill rises, at the top of which are several large boulders. Many smaller rocks, trees and shrubs cover the hillside.

The kindergarten occupies the extreme south of the building and the room has large French doors opening out upon a flagstone terrace. Two series of cement steps with grassy terraces on either side, lead down to a large flat, grass-covered area which might be described as an amphitheater, where several large shade trees grow. Rustic benches have been placed beneath them. With the exception of these, the pond, and the black cinder paths around the building, everything has been left in its natural state.

Surrounding the entire property, we have the woods—with the old stone walls, rocks both large and small, some covered with moss and lichens, some caves, hills and small valleys, trees and bushes and the brook which loses and finds itself intermittently.

Dr. Kilpatrick in his "Foundations of Methods", says: "The main business of curriculum making is two-fold—first, to know what interests, native and acquired, lie in the child's nature; second, to know how these may be stimulated, guided and directed so as to bring growth."

Bearing this in mind, it is hoped that this study will be of some value in building a curriculum for the development of young children.

The four year old group is conducted out of doors (except in stormy weather), with the exception of the rest period when the children lie on cots indoors. The play of these children is spontaneous and self-initiated. They roll on the grass, jump in the dry leaves, walk in weeds, feeling the sensation of brushing against grasses and getting stuck-up with burs and stickers, following trodden paths through the woods and coming unexpectedly upon other children hidden in tall grasses. Down at the brook what fun it is balancing on stepping stones, lying flat on the ground and thrusting fingers into miniature waterfalls, sailing leaves in the water, watching the jewel weed turn silver in the water.

In their dramatic play the children are often squirrels, gathering nuts (acorns) and hiding them under bushes or stones and then pretending to sit up and eat them. There is always much conversation about the play.

The large rocks are boats, passenger boats going to Boston or even to Brooklyn or New York City or any familiar place. Sometimes they are pirate boats and there is much shooting. Long sticks picked up in the woods are the guns. The span of interest is usually about ten minutes. Boys and girls both participate in this play.

They also play at making houses of stone, carrying them for several hundred yards. These are placed in squares and larger stones are sometimes brought in for furniture. Moss and grass make the rugs, acorn cups are the dishes. The children themselves or the dolls are the babies.

Bakery shop is very popular. Mud pies are made and baked in the sun. Pulverized stone, which they spend some time pounding, makes sugar to sprinkle on top.

In order to interpret the school life of the young child, we should attempt to consider which drives are most urgent and how he attains his ends. We need to develop an appreciation for the highly sensory, experimental, trial and error sort of thing that is most noticeable at this age. Learning at this time has its beginning in activity for activity's sake. The results of experiences are many times quite accidental on the child's part. Therefore, it seems quite logical that these simple, sensory experiences must precede the more conscious, purposeful learning of the later stages of development. The experiences offered by climbing trees and rocks, stepping on stones in the brook, paddling with hands in the water, rolling down the terraces and jumping into piles of leaves, are so closely bound up with language uses and dramatization, that any situation which tends to separate them, devitalizes the learning of the four year old. On the other hand, any activities, such as these, which have their beginnings in the liberating atmosphere, must go far toward vitalizing the learning of the four year old.

The five year olds are indoors during the first hour of the morning, although during the warmer weather the doors are fastened back and the children are encouraged to take their work out on the terrace. The last period, however, they are allowed freedom of expression out of doors. They are encouraged to experiment with all the materials on hand, to have dramatic play or any form of play suggested by the natural resources.

One of the earliest interests of this group was "boats". Quite a study of boats was made. Pictures and models of boats were brought in and stories read. Boats were classified as to kind, and the history of boats from rafts to modern transports was discussed. Various models of boats were made and when completed were naturally tried out on the pond.

Since many of these children have fathers who belong to yacht clubs, a regatta seemed in order. This necessitated the classification of boats—all sail boats must race together, all motor boats at another time.

Several meetings were held and certain rules made for the entrance of boats. It was decided to give a pennant to the winning boat of each class. From actual experience, these five year olds learned about navigation—the importance of the wind; how much faster the sail boats went than the others because the wind caught the sail. (The children knew the mechanism of the motor boats but since they were unable to actually install a motor, had to depend upon the wind for these too.) It was great fun too, to be able to report on the direction of the wind for we must know just where to start the race. The test was made by tying a cloth to a stick. Beside all the knowledge gained, there was the learning of fair play and to be a good loser. Both boys and girls participated in this play.

One experience down at the pond led to another and frogs, turtles, salamanders, snails and fish were not to remain unnoticed, especially since several of this group had been members of the four year old group last year and had watched tiny pollywogs hatch out of the frogs' eggs, collected from the pond in June. What fun it had been to set the frogs free and watch them jump into the pond and swim away. Now there were some big, green, grandfather frogs, whose throats puffed up when they croaked and who dove and swam away under water when you tried to pick one up. Cunning little salamanders and red spotted newts sat and blinked at us. The mud turtles too, seemed anxious to perform and often snapped up a fly which the children caught for them. Some of the older children of the school painted the shells of the turtles, hoping to be able to identify them when they returned next spring after hibernating all winter. Many stories were found about the habits of the pond folks and the fourth grade children helped with such questions as, "Why doesn't the turtle starve while he is hibernating?"

These children showed no sign of fear of any of the little animals. It so happened that it was a girl who made the first attempt to pick up one of these animals. The frogs were hardest to catch; just one girl was able to accomplish it and hold it long enough to compare it with a toad. The girls squealed more than the boys when the salamanders ran up their arms.

One day the question arose, "How far does the brook go?" A group of boys and girls followed its course as far as possible and found that it formed another pond in the swamps back of City Park. Much enjoyment was had in losing the course and picking it up again. One boy who had evidently been doing some thinking for himself shouted, "Oh I know what makes the brook turn. It bumps into things." It had turned around a large boulder. The following day this same group was interested enough to walk half a mile down the road to discover where the brook came from. They traced its source to a large lake. The brook falls over a stone spillway and runs under the road and twists and turns through the woods back of the school grounds. Several of these children reported that they had taken Mother or Daddy or some other member of their family to see it that week end.

One rather warm day in October, after a very heavy rain, the brook was overflowing. All the hollow places were flooded and one of the small wooden

bridges over the brook was washed away. Here was a splendid opportunity to see how fast sticks would rush down the stream. In one place some branches were blocking the course and forming a dam. This suggested the building of a dam. Logs were hauled from the woods and stones were laid down and plastered with mud. Eventually quite a strong dam was completed. The water settled in the hollow and formed another small pond. Although about twenty children participated in this project in various ways, two boys did the actual building of the dam. "The pond" remained about a week. After that the water dried up and the dam was broken down. From time to time however, the brook has been flooded in other places.

Five year old Harry came gleefully into Kindergarten one morning with a clay bowl. "Look what I made out of real Indian clay." When questioned, he told how he had gone down near the lake and "dug and dug" until he found clay. He took some home and he and his sister had made bowls. That was what the Indians did. The rest of the group were curious to know where this clay could be found so Harry led us to the place. We took spoon shovels and tins and dug and dug until we found clay. It was quite dry and needed to be mixed with water before it was the proper consistency for modeling. The claycrock was filled and for several days many bowls and dishes were modeled and baked. Later they were painted and waxed.

This little excursion was food for much discussion; "Where does clay come from," "Why can't we use sand?" Five mothers reported that their children had gone to the spot and brought home clay and modeled with it.

What a thrill we had when the thermometer registered 20 degrees and the pond was ice! It was thick enough to hold us. We could jump hard on it. This discussion brought out some interesting facts: running water does not freeze, the brook was running fast, the large lake was not frozen solid. It was too deep. It takes longer to freeze. Some chunks of ice were broken up and put in the sun. Before the children went home there was a puddle of water. Pans of water were carried out and placed in a shady place and the next morning were frozen solid again.

It seems to be the unanimous opinion of this group that it is most fun when it snows. After the last snow storm, the children prevailed upon the custodian to allow the snow to remain on the terrace so they might do the shoveling. He agreed to do so and the fun began. They cleared the stone terrace and at the same time packed the hills for coasting. Since there were only three sleds, there was splendid opportunity for sharing and fair play. The three children who owned the sleds (two boys and a girl), were most unselfish so everyone who wished, had at least one turn. One boy proved expert at steering because he could steer over the bridge and go farthest. He was finally selected for a steady job and about half the group preferred riding with him. One little girl unearthed a piece of tin from the woods and used that to slide down on. The children who were not coasting lost no time waiting for turns but found lots of fun building snow houses, forts and men.

With the coming of the snow the children missed their little animal friends. The squirrels, "Blackie" and "Bushy" had not been seen for two or three days and the little chipmunks who were always running along the stone wall were nowhere to be seen. "Blackie" as his name suggests, is a black squirrel who has become quite tame. He will run for nuts which he begs from the children. No one has been able to find his home. "Bushy" is a gray squirrel, also quite tame. His home is a large nest in one of the big oak trees. It is in a fork about thirty feet high. It is apparently made of dried grass, leaves and sticks. "Bushy and Mrs. Bushy" have been busy all fall gathering nuts and taking them up to the nest. We have not seen the babies but we are watching and hope to see some in the spring.

We are all sure that "Blackie" and "Bushy" would not be able to find nuts buried beneath the snow, consequently, all kinds of nuts and crusts of bread were placed upon the benches and stone walls, and in the crotches of the trees.

Thoughts were soon turned to the birds. Feeding stations, made of boxes and two wooden trays were constructed and fastened to trees. These are kept filled with nuts, seeds, cracker crumbs and pieces of suet. The children are intensely interested in this study of winter birds. As soon as a bird is seen he is identified and his name appears on a chart. Then we try to find out all about him. So far we have seen bluejays, chickadees, sparrows, and big black crows. The bluejays are so greedy that we have had to hang ham bones down in the woods to keep them away from our trays.

It is noticed that as soon as the children come down into the woods, all feeling of restraint seems to leave them. Their conversation changes, they are free to play hide and seek, to roll in the leaves, to climb trees or to use the rocks for their dramatic play. There is no chaos but a peculiar kind of softness seems to reign in these open spaces.

It seems to me that this school environment offers exceptional opportunities for children to observe and to have first hand experiences with some phases of real living.

ABSTRACTS

BLOUGH, GLENN O. "Pets at Home and at School." *The Instructor* 55:61. September, 1946.

This is an illustrated unit, adaptable to all grade levels. There is an overview and suggested procedures for teaching this unit. This includes objectives, procedure, supplementary lesson problems, a bibliography for each of the three levels—primary, middle, and upper grades, and a teacher bibliography. Then for each grade level there are various kinds of activities suggested. Altogether this is one of the finest science units one will find any place.

BLOUGH, GLENN O. "Elementary Science Objectives." *School Life* 29:28–29. October, 1946.

Objectives listed are: (1) to help children to cultivate a scientific way of looking at things and to give them a sound method of procedure for solving problems, (2) to teach them certain concepts and generalizations which they can use in interpreting what they see about them, (3) to open new avenues of interest and satisfactions, (4) to assist in the development of desirable social behavior, and (5) to aid in developing certain appreciation for the environment. Problems are set up. Methods used in solving the problems are very important.

BLOUGH, GLENN O. "The Case of Science in the Elementary School." *School Life* 28:3–5. July, 1946.

It is unfortunate that so many elementary teachers are not adequately prepared to teach science. They do not have sufficient science background and often confuse fancy with fact, and emphasize unimportant things. A few schools have well organized science programs.

An elementary teacher should have a survey course in the physical and natural science, geared to the needs of the elementary teachers. It should be non-technical in nature, designed to help her to answer children's questions. She should have experience in the actual use of simple experimental apparatus. The course should show her how to make simple apparatus. It should show her some of the methods for teaching science to children and acquaint her with elementary science books, references, free materials, and visual aids.

WHEATLEY, DOROTHY E. "Star Study in the Grades." *The Instructor* 56:17; 67. January, 1947.

Many suggestions are offered for making a study of the stars an exciting adventure and a worth-while experience. The author especially emphasizes the values of evening observation of the stars. There is a good bibliography.

DRAHOS, NICHOLAS. "Hedgerows." *Cornell Rural School Leaflet* 40:1–32. Fall, 1946.

Anyone reading this excellent unit will learn a lot about hedgerows, unless he is already more or less an authority on hedgerows. The illustrated unit points out many of the values of hedgerows—soil protection, wild life haven, wind breaks, sources of income. Many suggestions are made as to the kinds of plants suitable for hedgerows.

BARTON, THOMAS F. "Teaching Soil in the Lower Grades." *The Journal of Geography* 45:309–316. November, 1946.

This elementary science unit presents basic concepts and methods of presenting concepts: story telling, experiments and demonstrations, construction and field trips.

PEARL, PRISCILLA A. "An Elementary School Science Museum." *N.E.A. Journal* 35:496–497. November, 1946.

A science museum can be a valuable addition to an elementary school. The article describes a museum that was the result of several years observation and experimentation. The article describes the best location, essential equipment, types of possible exhibits, special features, bulletin boards, and types of activities that may be assigned to students. There is a list of thirteen purposes and outcomes.

GREEN, IVAH. "How to Organize an Insect Unit." *The Instructor* 55:32, 89, 97, 99. September, 1946.

This is a unit intended for all grades of the rural school. Activities for various grade levels are indicated and also ways in which such a unit can be integrated with other school work.

ZINTS, VIRGINIA, AND JOSLIN, MARY A. "An Aviation Unit." *The Instructor* 55:41, 96, 100, 102. September, 1946.

This is a unit for the middle and upper grades. Included are science experiments, suggested class trips, culminating activities, outcomes, and bibliography.

SANDERLIN, MARY F. "Simple Experiments with Air." *The Instructor* 56:20, 83. November, 1946.

This is a unit suitable for primary and middle grades. Objectives are stated, how the unit may be initiated, descriptions of several simple experiments, suggestions for coordinating and recording, and supplementary activities.

HULL, HARRIET. "The Wonders of Salt." *The Instructor* 56:12–13. January, 1947.

This is an illustrated elementary science unit describing the uses of salt, its origin, and its preparation for use. There are suggested experiments, reports to make, stories to read, and test questions.

BREITNER, DOROTHY B. "How to Make Lantern Slides." *The Instructor* 56:37, 60. January, 1947.

Very brief but practical suggestions for making lantern slides. Suitable for all grades.

BOOK REVIEWS

CRAIG, GERALD S., AND BURKE, AGNES. *Science All About Us.* Boston: Ginn and Company, 1946. 160 p. $1.04.

This is Book I in the series, *Our World of Science.* It is beautifully illustrated in color and will delight the children who are privileged to use it. The story of changing seasons, weather and living things is told in pictures and words. An introduction to rocks, machines and engines is given, all in the simplest way. New words in addition to the basic reading list for the first grade are gradually introduced to give a science vocabulary.

—W. G. W.

CRAIG, GERALD S., AND DANIEL, ETHELEEN. *Science Through the Year.* Boston: Ginn and Company, 1946. 224 p. $1.16.

This is the second book of the series, *Our World of Science.* The activity of some boy or girl of about the second grade level leads directly into living experiences about which the children are reading. Many fields of science are covered, as, weather, seasons, soil and rocks, sun, air, water, and plants. The whole book is fully illustrated with interesting color pictures.

—W. G. W.

CRAIG, GERALD S., AND BALDWIN, SARA E. *Science Every Day.* Boston: Ginn and Company, 1946. 252 p. $1.20.

This is book three of the series, *Our World of Science.* After discussing the day sky and night sky, many pages are given to the foods, homes, and habits of animals. There are very interesting things told about what can be done with magnets and electricity. Travel by air, various things that water does, and the life cycle of living things complete the rest of the book. The book is full of illustrations in color.

—W. G. W.

CRAIG, GERALD S., AND HURLEY, BEATRICE D. *Exploring in Science.* Boston: Ginn and Company, 1946. 189 p. $1.28.

This is Book IV in the series *Our World of Science.* It deals with the earth, its atmosphere, and the sun and moon. The behavior of different types of animals and the value of plants to us cover the activities of living things. There are interesting chapters on gardens, rocks and minerals, and conservation. Both black and white and color are used for the illustrations.

—W. G. W.

CRAIG, GERALD S., AND HILL, KATHERINE E. *Working with Science.* Boston: Ginn and Company, 1946. 384 p. $1.36.

This is Book V in the series, *Our World of Science.* It is written in language well suited to the fifth grade. It begins with our nearest star, the sun, and continues with a discussion of light, heat, and fire. The changing seasons and climate lead to an account of the habits of animals and changes in plants. In physical science, weather, magnetism, and electricity are adequately treated for the grade. The book is well illustrated, and a glossary of science words is included. —W. G. W.

PARKER, BERTHA MORRIS. *Water Supply and Sewage Disposal; Foods; Keeping Well; Adaptation to Environment; Superstition or Science.* Evanston, Illinois: Row, Peterson & Company, 1946. 36 p. each. $0.32 each.

The above five titles are a part of the Basic Science Education Series. Co-author in the *Keeping Well* unit is M. Elizabeth Downing, M.D. The author is a well-known teacher of elementary science in the Laboratory School of the University of Chicago. Most of the units have been checked by scientists for scientific accuracy.

Each of the units has a very attractive cover with very appealing illustrations both in color and in black and white found throughout the textual material. The units may be used as a source of excellent, scientifically accurate material for the elementary reading for the upper grades. The illustrations will be enjoyed at all levels. Junior high science teachers could also use the units as source material. Altogether, considering the low cost, they are an unusually fine series of elementary science units.

—C. M. P.

BLOUGH, GLENN O. *The Monkey With a Notion.* New York: Henry Holt and Company, 1946. 88 p. $2.00.

Both children and grown-ups will laugh when they see the jacket cover of this book. Rare would be the boy or girl (or the adult!) who could resist the temptation to look inside and read what funny notions a certain monkey named Snick had. There they will see many amusing pictures and laugh with enjoyment at many funny incidents. There's the spinster Miss Peasley, keeper of the pet shop; Rheba the parrot, the little boy Tandy, the constable, the baker, and others.

To tell any part of the story would be like letting the monkey out of the cage. (You will get what I mean when you read the story.) That I am not going to do and so spoil this delightful story for the reader. Although intended for children 8 to 10 years old, it is a book that will appeal to all ages. It is a Junior Literary Guild selection.

Mr. DeCuir did the excellent illustrations. Serving in the U. S. Navy, during the war, as an illustrator, he is now a motion picture illustrator in Hollywood.

Mr. Blough is a specialist in elementary science in the U. S. Office of Education. He is well-known to most readers of SCIENCE EDUCATION as an author of a series of elementary science readers and for his many excellent elementary science units published in *The Instructor* and elsewhere. A member of the faculty of the Laboratory School of the University of Chicago before the war, he served as a Lieutenant Commander in the U. S. Navy during the war.

C. M. P.

NORLING, JO AND ERNEST. *Pogo's House: The Story of Lumber; Pogo's Fishing Trip: A Story of Airplanes; Pogo's Trainride: A Story of Freight Trains; Pogo's Letter: A Story of Paper; and Pogo's Mining Trip: A Story of Gold.* New York: Henry Holt and Company. 40 to 44 pages each. $1.75 each.

The Pogo books comprise a series of upper primary or intermediate grade science readers that will be the joy of any boy or girl. Each is about an important industry and is based on the author's personal observation and careful study of the processes described. The information seems accurate and authentic.

Mrs. Norling is a graduate of the Central Washington College of Education at Ellensburg, Washington, and was a major in psychology at the University of Washington. She has taught in the elementary schools of the State of Washington and in Los Angeles. Mr. Norling who does the illustrations is a graduate of Walla Walla College and has studied art at the Chicago Art Institute and the Chicago Academy of Fine Arts.

The processes are graphically illustrated in the inside front and back covers of the respective books. Other child-appealing illustrations are found throughout the textual materials. Boys and girls will want to hear and read again and again the stories about the adventures of the little boy John and his dog Pogo.

F. M. D.

STEEL, MARY AND HUDSPETH, JACK. *Do You Know?* Austin, Texas: The Steck Company, 1946. 80 p. $0.24.

Do You Know? is a worktext for the first grade. It consists of many pictures and suitable reading material. Particular attention has been given to reading difficulties and vocabulary building. Many important science cancepts are developed. These include: Things Around Us, Animals, Weather, Machines, Health Habits, and Plants. A test and Teacher's Manual to be used with this unit are available. A good bibilography and word list are found in the Teacher's Manual. Many elementary teachers will find this worktext most helpful and children using it will learn a lot of science.

C. M. P.

WOOD, EILEEN. *Airport Summer.* New York: Henry Holt and Company, 1946. 190 p. $2.00.

Out of her own experiences as a flyer and operator of an airport in the middle West, Eileen Wood writes this excellent book for boys and girls ten to twelve years of age. As a book buyer for the elementary schools of a southern Michigan town, after her graduation from the University of Michigan, she learned aviation is a favorite topic of adolescent boys and girls.

It is not only a study in aviation, operating an airport, activities in a model plane club, but also an excellent study in character education. Terry's parents realized that during his summer vacation with his Aunt Peg, Carol and Joe, he had learned far more than just the rudiments of flying and constructing a winning model plane.

The book is written in an easy readable style and illustrated by Walter Buehr, who is now an instructor at the Art Students League in New York. Teen age boys will profit by reading the book. The author never loses sight of the importance of being accurate in describing the actual workings of an airport, the airplanes, and flying.

F. M. D.

RYAN, BETTY HOGAN. *Porpy, the Skunk.* New York: Ziff Davis, 1946. 31 p. $1.25.

Porpy's Day also would have been a good title for this "sleep-time" story book. Porpy gets the usual scrubbing and admonitions from his mother skunk that boys and girls get from their mothers before going to school so that little folks readily put themselves in the place of Porpy. And like them he doesn't heed all that his mother told him to do about not playing by the wayside on the way to school, and gets into trouble. He gets wet, he gets spanked; but finally the day is over and his mother fondly tucks him into his little bed for the night. On the jacket is a picture of the author and her four little daughters; who no doubt first heard the story of Porpy. Mrs. Ryan was born in West Hartford, Conn., and was educated at St. Regis College in Massachusetts. She studied Journalism and later taught English.

Peter van Scozza, an art director for a Buffalo advertising agency, has beautifully illustrated the book in color. The children will like the pictures of all the skunk characters dressed up and living in houses just like children and grown-ups they know.

F. M. D.

DAWSON, MILDRED A. *Farm Animals.* Dansville, New York: F. A. Owen Publishing Company, 1946. 24 p. $0.50.

Each page consists of one or more farm animals for hectographing. Elementary science teachers having access to a hectograph will find this book most useful.

G. E. D.

ZIM, HERBERT S. *Elephants.* New York: William Morrow & Company, 1946. Unpaged. $2.00.

This is one of the most delightful stories that a young boy or girl can read. The author is a well-known science writer and the illustrator is a noted artist. The many illustrations, often taking up much of the page, add greatly to the enjoyableness of the book. The author tells with clear simplicity and accuracy many interesting facts about elephants—where they live, what they eat, how they are caught and trained, what they can learn to do, their size and weight, and all about their tusks and trunks. The book is probably best suited for the intermediate grades.

—C. M. P.

TRUE NATURE SERIES. *Animals of the Woods; Gray Squirrel; Snapping Turtle; Water Birds; Black Bear Twins; Three Little Kittens; Pride, the Saddle Horse; Shep, the Farm Dog; Goats and Kids; Bunny Rabbit; Animals on the Farm; and Elephants.* Chicago: Encyclopedia Britannica Press, 1946. Unpaged. $0.50 each.

Leading authorities in their field have prepared the text material and the photographs. They are designed to give authentic, interesting, and first hand information in a manner especially appealing to children. They will undoubtedly be read by millions of children. The still pictures were from action film pictures never before printed. They were not shot as posed photos, but were all taken from motion pictures, some of which took over two years to produce. The story in each case is told mainly by photographs, the textual material really being at a minimum. Every detail of picture and story has been carefully checked. Children will want to read the story and see the pictures over and over again. In practically all cases, the pictures are taken from motion films carrying the same title.

Seemingly these science stories could be used at any grade level—primary to upper grade. It is difficult to conceive of any normal boy or girl not being most delighted in seeing the pictures and reading the stories.

—C. M. P.

DEWITT, JOHANNA. *The Littlest Reindeer.* Chicago: Childrens Press, Inc., 1946. 24 p. $1.00.

The boys and girls of ages 5 to 8 will be delighted to read this most interesting story. They will learn why the reindeer was so discontented and what animals hear about his difficulty. Animal life in the Arctic region and their habits and migrations are vividly described in story and pictures. This book would make a most appreciated gift.

This very attractive book for children is beautifully illustrated by Phoebe Erickson and will be found most useful as a supplementary

reader in elementary science. The element of repetition makes the book useful for first and second grade work. The jacket and pictures feature the colors, brown and blue.

—G. B. K.

FRISKEY, MARGARET. *Adventure Begins at Home.* Chicago: Childrens Press, Inc., 1946. 45 p. $2.00.

The pictures in this book were made by children under the direction of the art director of the Chicago Publications and was lithographed in six colors. It combines love for a pet animal and desire to own one with various adventures on the part of a young boy and his sister. The book is a complete departure from the usual story treatment. It features green and red in the book make-up in general. This book both pictures and story, will appeal to children in the primary and early intermediate grades. It is the story of a city boy's love for a run-a-way horse and his adventures in the country. A list of the names of the children who made the pictures is included in the back of the book. As a gift-book for a little boy or girl, it is excellent.

—G. B. K.

COBLENTZ, CATHERINE CATE. *Scatter: The Chipmunk.* Chicago: Childrens Press, Inc., 1946. 22 p. $1.00.

Scatter is the youngest of three chipmunks. Mother Chipmunk is ever disturbed about the safety of Scatter, but she need not be, for a little girl always happens on the scene to save him from harm. The pictures and illustrations by Bertha Schwartz of Scatter and his narrow escapes will prove most amusing to the young child. This is a most interesting book for ages 4 to 7. The jacket and pictures feature the color, brown.

—G. B. K.

FRISKEY, MARGARET. *Chipmunk Moves.* Philadelphia: David McKay Company, 1946. Unpaged. $1.00.

Children from five to eight will thoroughly enjoy both the delightful story and the beautiful illustrations found on each page. The illustrations are by Lucia Patton. The story tells how Chipmunk moves from the meadow to the orchard, of his cool reception there by the other animals, but he gets a chance to prove that is what you *are* that counts.

—G. B. K.

HENDERSON, LUIS M. *A Child's Book of Birds.* New York: Pied Piper Books, Inc., 1946. 16 p. $0.25.

This is one of the Pied Piper books designed with the special purpose of bringing to children in a beautiful but inexpensive edition, the very best of the old stories and the most promising of the new. The stories are adapted or written to meet modern educational standards and are carefully planned for both easy and enjoyable reading. Each title is fully illustrated by a leading artist, with at least sixteen pages in full color. This book on some of the common birds definitely lived up to this standard. It seems quite suitable for the primary grades.

—G. B. K.

DAVIS, GEORGE. *An Animal Tour.* New York: Lothrop, Lee & Shepard Co., 1946. 48 p. $0.50.

Boys and girls who love the zoo can learn a lot from this book about animals all over the world. There are 22 photographs in full-page color, together with a brief description of the characteristics and habits of each animal and bird described. The information seems to be completely accurate. The book is primary grade level.

—G. B. K.

CHESWRIGHT, PATRICIA. *The Farmyard Book.* New York: Lothrop, Lee & Shepard Co., Inc., 1946. 48 p. $0.50.

Two children, Helen and Sally, spend their vacation at their Uncle Jim's farm. Here they make the acquaintance of various farm animals and learn some of their habits. There are twenty-two full page pictures in color as well as several black and white illustrations among the textual material. This is an appealing book for the primary and intermediate grades.

—S. M. A.

MCINTIRE, ALTA. *Stepladder Babies.* Chicago: Wilcox and Follett Company, 1946. Unpaged. $1.00.

The textual material is based upon an actual incident that happened on the author's back porch. It is a story that tells how Billy and Ann watched the robins day by day as the parents built the nest, hatched the eggs, and fed and took care of the young. The story will appeal to children as will also the beautiful illustrations, many in color, by Fiore Mastri. The book is suitable for the primary and intermediate grades.

—S. M. A.

LIPSCOMB, GEORGE D. *Tales from the Land of Simba.* New York: The Beechhurst Press, 1946. 96 p. $2.00.

The land of Simba is lion country, where Simba, king of beasts roams the grassy African plains. Five exciting stories are included in these tales. The first is the story of the finding of the pygmies by Du Chaillu in 1863. The second story is that of the Masai boy Simba Bwana (the Lion Master). Kubwa Simba (the Great Lion) is the unconquered hero of the third tale. The fourth is about the son of Kubwa Simba. The last tale is about Jaho Tembo (the Ghost Elephant).

Tales from the Land of Simba remind one of Kipling's *Jungle Tales.* Teen age boys and girls will enjoy these fine stories.

—S. M. A.

KANE, HENRY B. *The Tale of the Wild Goose; The Tale of the Bullfrog.* New York: Alfred A. Knopf, 1945. Unpaged. $1.75 each.

The author is one of America's finest nature photographers and a reading of the textual material indicates that he is equally clever with his pen. He has supplemented the textual material and photographs with many of his pen-and-ink sketches.

Both of the books will delight any child reading them. They are probably best suited to the intermediate grade level. Elementary science teachers will find the stories excellent for supplementary reading or in working out science units. —C. M. P.

SAARINEN, LILY SWANN. *Who Am I?* New York: Reynal and Hitchcock, 1946. Unpaged. $1.50.

Supplemented by illustrations by the author, the textual material is a series of statements of facts about various animals that could well be used as a game of *Who Am I?* In fact that is the idea the children will soon get. The illustrations are amusing and will appeal to the children's sense of humor. Animals depicted: Zebras, polar bear, skunk, hippopotamus, rabbit, elephant, mouse, camel, red squirrel, leopard, giraffe, monkey, and red fox. The Last Who Am I is the little boy himself. The material is about the primary level.

—G. E. D.

BAER, MARIAN E. *Without Fire: A Book of Experiments.* New York: Rinehart and Company, 1946. 48 p. $1.25.

Here is a series of 33 experiments suitable for elementary science. No heat is used in carrying out the experiments. They can be used as experiments by the pupils or as demonstrations by the teacher. They would be adaptable to various grade levels depending upon what level a particular concept is being developed. The experiments are on: air is something (8); a great force holds things down (6); air is lighter than water (6); and some things are heavier than others (7); and more secrets about air and water (6). —C. M. P.

SCHNEIDER, HERMAN AND NINA. *How Big Is Big? From Stars to Atoms.* New York: William R. Scott, Inc., 1946. Unpaged. $1.50.

In simple text, but chiefly by illustrations by A. F. Arnold this elementary science book of intermediate grade difficulty shows the comparative size of things from Terry, a four-foot boy, to elephants, a tall oak tree, Empire State Building, Mount Everest, the moon, earth, sun, stars, dogs, a mouse, fleas, mites, protozoa, algae, atoms, electrons, neutrons, and protons. The pages are in color (rose and olive green) with the illustrations in white and color. It is a very attractive book that will appeal to children. It does a fine job in putting over the idea of comparative sizes of things. —C. M. P.

PEASE, JOSEPHINE VAN DOLZEN. *This Is the World.* Chicago: Rand, McNally & Company, 1946. 72 p. $2.50.

Whether elementary science or geography (and it is really both), *This Is the World* is an outstandingly fine book.

Illustrations in color by Esther Friend add much to the attractiveness and general appeal of the book. The content material, appealingly written, is as follows: This Is the Earth, This Is the Sun, Land and Water Everywhere, This Is the Water, This Is the Land, These Are the People, and Getting Together. Only the last two may be said to be more geography than elementary science. The text material is probably best suited to the intermediate grades, but even beginners will enjoy the pictures.

—G. E. D.

PEASE, JOSEPHINE VAN DOLZEN. *It Seems Like Magic.* Chicago: Rand McNally & Co., 1946, 80 p. $2.50.

Written for children in the fifth to ninth year age group, this book with its colored pictures appeals even to adults. Science laws are worked out clearly with diagrams which are a great help in interpreting the underlying principles of engines, airplanes, rockets, boats, the telephone, and radar. A good idea, superficial of course, of how these things work is given. The text is easy to read, and every child will be fascinated in reading about the common mysteries of science. —W. G. W.

CAVANAH, FRANCES. *Our Country's Story.* Chicago: Rand McNally & Company, 1945. 72 p. $2.50.

Our Country's Story is a book beautiful to look at, fascinating to read—the finest possible introduction to the story or our country. There are many unusually fine, pertinent illustrations by Janice Holland. The story traces the great events and characters that have made this a country envied by most of the others of the world. Fortunate is the child that can get such an introduction as this. Such a book as this ought to make an ever lasting impression and produce a feeling of pride that his heritage is America. —G. E. D.

RANSOM, ELMER. *The Woodland Book.* New York: Howell, Soskin, Publishers, 1945. 109 p. $3.00.

The author is a distinguished writer on outdoor life. In this book, he writes entertainingly about the following: the purple martin, bluebird, hummingbird, bobwhite, redheaded woodpecker, the mysterious crow, the snowy egret, arctic tern, mockingbird, chimney swift, bald eagle, opossum, beaver, raccoon, otter, the American osprey, and the crested flycatcher. There are many interesting illustrations by Sabra Mallett.

The book is suitable for the upper grammar grades and junior high school pupils will enjoy reading the intimate sketches. —S. M. A.

BRONSON, WILFRID S. *Coyotes.* New York: Harcourt, Brace and Company, 1946. Unpaged. $1.75.

This is an elementary science book with simple text and many illustrations by the author in black and white. It is suitable for younger children of primary grades. The author is well-known for his earlier *Turtles, The Wonder World of Ants, The Grasshopper Book, Horns and Antlers,* and so on. Before the white men came, all the coyotes lived west of the Mississippi and south of Canada. Now they have spread into several eastern states and all the way to Alaska. This seems to be a most excellent supplementary reading in elementary science.

—S. M. A.

BUFF, MARY AND CONRAD. *Big Tree.* New York: The Viking Press, 1946. 80 p. $3.00.

The author-artists had the interesting idea of inserting interleaves which give the history of the Sequoias and shows what events of world-wide interest were happening at the same time. For example, when the Sequoia tree, Wawona about which the book is written, was thirty centuries old, a child was born in a humble stable in Palestine. The child was Jesus. When He grew to be a man, He would bring into the world a new idea. The idea was that all men are brothers. Just as the life of the tree is paralleled with a chronological list of events of world-wide interest, stories of animal and human life within the environment of the tree are described as to habits and some of their chief characteristics. Some of the animals written about are the trade rat, golden eagle, bobcat, deer, owl, skunk, chipmunk, and bear. The children will be interested in knowing why the great giant Sequoia tree, Wawona was able to live to be the oldest living thing on earth. How was the tree able to resist insects, wind and fire for twenty-five centuries? What did the tree feel was its greatest enemy? Why did it envy the animals?

The book is written in large print, beautifully illustrated and has a most attractive jacket showing the huge trunk of the Big Tree. The book is appropriately dedicated to the children of the future for whom these trees are saved. Readers of various ages will appreciate and admire this book. It is unusual and different. It is of biological and historical interest and a good example of the integration of basic knowledge.

—S. M. A.

HENRY, MARGUERITE. *Hawaii; Australia; New Zealand; Bermuda; Bahama Islands; British Honduras; Dominican Republic; and Virgin Islands.* Chicago: Albert Whitman and Company, 1946. Unpaged. $0.75 each.

This pictured geography series has illustrations in color and in black and white by Kurt Wiese. Interesting incidents about the discovery, early settlement, geography, peoples, climate, resources, and trade of each land are given. A map of the region is found on the inside front cover. Fifth or sixth grade pupils should readily read the textual material.

—F. M. D.

BARROWS, HARLAN H., PARKER, EDITH PUTNAM, AND SORENSEN, CLARENCE WOODROW. *The American Continents.* New York: Silver Burdett Company, 1946. 314 p. $2.24.

The Continents: North America and South America are the subject matter of this fifth grade geography textbook. It is the second of a series of three textbooks designed for a unified course in elementary geography. The first book in the series is, *Our Big World,* and it contains the essentials of global geography for beginners. About two-thirds of the textbook, *The American Continents* is given to the study of the United States.

Children like to know how things come about, why things are as they are. Man lives in a changing world; geography is an evolutionary subject. The historical development as man migrated westward, is graphically presented in pictures and treatment. Pictures, many of them full-page size in color and hues, are clear and beautiful. The children and their parents will be proud to own this textbook. The pupils and teachers alike can appreciate the helpful questions given at the end of each part under the headings, "Things to Remember About Our Country" and "Exploring and Finding for Ourselves".

The two authors listed first are at the University of Chicago. Sorensen is a special lecturer in geography at the University of Minnesota. The drawings are by Milo Winters. I quote from the preface, "An outstanding characteristic of *The American Continents* is the simplicity of the textual material and the maps. An earnest effort was made to fit the phraseology to the latest established standards. The maps were designed solely to serve the purposes of the text. They are not intended, in other words, to serve as general reference maps. This is not an atlas." However, the maps seem adequate in number and quality in every respect.

Canada, South America, Central America, and the West Indies are covered in such a way that the facts and ideas concerning them will become of interest and value to our future citizens. It is they who must carry on the good neighbor policy and work jointly with them for a better America and a better world.

The pictures and text-material will raise why, where, and when questions from the boys and girls. They will learn to consult the Atlas, the globe, and other geographic references material in an effort to learn and know. Better still they will consult others: the teacher, the parents, and the grandparents in order to learn more about the history and geographic development of the New World.

—F. M. D.

HAGNER, F. H. *What Goes on Around You.* San Antonio, Texas: Position Finder Corp., 1946. 28 p. $2.00.

This handbook discusses among other things: the rotation and revolution of the earth, earth's relation to the heavens, seasons of the year, path of earth around sun, locations on the earth's surface, latitude, longitude, directions on the earth, the earth's magnetic poles, date, time, the sky, making sky charts. Many illustrations (18) are included. There is simple star chart finder that teachers and beginners in star observation will find most useful. Included also is a time zone and date finder, and a constellation of the heavens. Teachers and students of geography, astronomy, general science, and physical science will find this a most helpful aid in studying the stars and the earth in its relation to the other heavenly bodies.

—C. M. P.

FOWLKES, JOHN GUY (EDITOR). *Educator's Index of Free Materials.* Randolph, Wisconsin: Educators Progress Service, 1946. 164 p. $3.50.

This is the thirty-fifth edition since its first publication in March, 1937. This attests to its wide use by teachers and indicates its significant educational value. The Index is an annotated listing of free materials which have significant teaching value. All sorts of sources of free materials are listed. The frequent revisions give fair assurance that the supply of free materials has not been exhausted. The organization follows largely the usual subject matter break-down. Science teachers will find the Index particularly useful. Not only will they find much free material listed in their own special fields, but also in related areas as well.

Every school should have an Index available to its teachers. It is difficult to think of any supplementary book that offers so many possibilities by means of which classroom teaching as well as the room appearance may be greatly improved and enriched. Individual teachers will find it a cheap price to pay for such a rich source of possible visual aids.

The editor is a Professor of Education and Director of the Summer Session at the University of Wisconsin.

—C. M. P.

HORKHEIMER, MARY FOLEY, AND DIFFOR, JOHN W. *Educators Guide to Free Films.* Randolph, Wisconsin: Educators Progress Service, 1946. 303 p. $4.00.

This is the sixth edition of the *Educators Guide to Free Films.* Many films which may be secured from other agencies as rental films are available to users of the Educators Guide as Free Films without rental or service charges. The total number of films listed is 1,883, having 3,261 reels. The number of new titles in this revision is 374. Films are listed according to subjects. Under science are listed 258 sound films (210 sixteen mm and 58 thirty-five mm) and 117 silent films (68 sixteen mm and 49 thirty-five mm). In addition there are many films in related areas that could be used in science classes. Surely all schools (and science teachers) using films will find this listing of invaluable service and a great money saver. Then, too, new films listed here, are likely to escape the school or science teacher's notice.

—C. M. P.

MURRILL, WILLIAM ALPHONSO. *Familiar Trees; Flowers.* Gainesville, Florida: the Author, University of Florida, 1946. 174 p; 120 p. $3.00 each.

These are two very interesting books. Teachers, especially elementary science teachers, biology teachers, scout leaders, and students will find the books filled with a great variety of nature lore and facts about trees and flowers. Almost one-third of the pages is given over to many excellent photographs. The author's literary style makes for delightful reading and you soon get the feeling that he not only knows what he is writing about but that he has a great love and appreciation for flowers and trees.

Familiar Trees is dedicated to the Boy Scouts of America and *Flowers* is dedicated to the Girl Scouts of America. Each book is introduced by a delightful story especially written for the Scouts. Boys and girls will enjoy reading the stories as well as the textual material which will be most helpful to them.

For many years the author was Assistant Director of the New York Botanical Gardens and more recently Professor of Botany at the University of Florida. He is the author of numerous publications such as: *Stars, Trees, Rocks, Reptiles, Florida Animals, Florida Plants, Edible and Poisonous Mushrooms,* and so on.

—C. M. P.

GESELL, ARNOLD, M.D., ILG, FRANCES L., M.D., ET AL. *The Child from Five to Ten.* New York: Harper and Brothers, 1946. 475 p. $4.00.

The two authors named are Doctors of Medicine. This book is based upon observations of "fifty or more children—at 5, 5½, 6, 7, 8, 9 years, and a smaller number at 10 years" individually and in schoolroom groups. The accumulated materials have been systematized according to "ten major fields of behavior: motor characteristics; personal hygiene, emotional expression; fears and dreams; self and sex; interpersonal relations; play and pastimes; school life; ethical sense; philosophic outlook. The purpose is to show the general patterns of growth and development in terms of chronological age, primarily from ages 5 to 10 years. Previous studies have been concerned particularly with other ages in child life.

No statistical treatment of quantitative data has been included. The authors' assumptions and

conclusions revolve around a concept of gradients of growth. The purpose is to set forth some guideposts in the gradients of growth to aid fathers, mothers, teachers, and others to understand child growth and development better. The discussion is frankly interpretive rather than statistical. Validity of conclusions rests upon studied observation and personal interpretation—not upon mathematically developed curves of growth.

The sequential character of growth and development is emphasized rather than time—fixtures for any given status, but behavior profiles and maturity traits are listed for the various chronological age groups. Stress is placed on growth like that of a plant—not one of accretion, but of fundamental organization and function. Many readers will find the lists interesting and useful.

It would have been instructive had the effects of environmental influences been studied more comprehensively. Psychologists who see conditioning as an all-important consideration in the process of child development will probably not be satisfied with the implications of the lists as given. How much influence great differences in environment may have in the pictures of patterns is not discussed as a fundamental determinant of behavior patterns. This is another phase of development which needs further intensive study. The authors are quite evidently stressing the nature of biological forces and the impossibility of getting away from their fundamental influences. They make the point in the later chapters that schools must work with these biological forces and not neglect them.

Chapter 18 discusses the place of the school in the developmental process. "Schools Are For Acculturation," is one of the sub-titles. "Schools are devices and teachers are agents designed to induct the growing child into this immense, moulding heritage. But this heritage is no mere hand-me-down from the past. It is something organic which must be lived into." The child is a *member* of the culture, not merely a candidate for it. A good point is made as follows: "The curriculum should not be envisaged as blocks of academic requirements, but as areas of educational opportunity corresponding to the major facets of our culture." Three culture areas are named to replace the "time-honored 3 R's" as follows: (1) Language Arts (conversation; drawing; writing; spelling; reading; listening; looking). (2) The Sciences (mathematics; natural science—physics, chemistry, biology; social science—geography, history, civics). (3) Personal-Social Participation (creative self-expression; arts and crafts; dancing; poetry, invention; technology; engineering; pre-vocational skills; social co-operation and leadership; aesthetic, ethical and spiritual appreciations). Most of us, as teachers, would agree that this concept of school life is more in agreement with life as it is lived than was the older concept which was more fragmentary in outlook, to say the least.

"A Philosopic Postscript" sums up the obvious purpose of the authors. "If we wish to do justice to the child's personality, we must think in terms of growth, in terms of his developmental maturity. This means a philosophy which recognizes the relativities of the life cycle. Developmentalism is the name of such a philosophy—the very opposite of fascism." —A. W. H.

RUSSELL, JOHN DALE, Editor, AND MACKENZIE, DONALD M., Assistant Editor. "Emergent Responsibilities in Higher Education." *Proceedings of the Institute for Administrative Officers of Higher Institutions, 1945,* Volume XVII. Chicago: University of Chicago Press, 1946. 192 p. $2.00.

This regular issue of proceedings includes eleven papers read at the 1945 session of the Institute by as many different administrative officers. Needs and developments in counseling and guidance; counseling of veterans; counseling of war workers; community and societal relationships of colleges and universities; development of university extension services; adult-education activities; improvement of senior-college curriculums; improvement of advanced curriculums in social science; historical aspects of faculty participation in administration; faculty points of view with regard to administration; and faculty participation in institutional government are the subjects of discussion in these papers. They are well worth reading, presenting as they do mature reflections on all of these important matters. The reader will probably be interested in particular papers which represent his special field of attention or concern. All present challenging problems in higher education. This reviewer would have been especially interested in further discussions of professional education in relation to general education. *Professionalized general education* is a phrase needing more attention and discussion.

The measurement movement in education is emphasized by Tyler in Chapter I more than in any other paper. If scientific education is to be quantitative, tests are vital. He mentions tests of mental ability; tests of aptitudes; tests of achievement; and placement tests. Guidance and counseling cannot be very wise and discerning without educational measurement.

Peatman and Smith in Chapters II and III emphasize machinery of veteran guidance in a college and an institute of technology, respectively. Some illustrative cases are given in the second instance.

Edwards, Zehmer, and Williams in Chapters IV, V, and VI discuss the important problems relating to education of all the people under community relationships, extension work, and adult education, respectively. How may we succeed in bringing educative influences to bear upon all classes of people?

McConnell—Chapter VII—is especially concerned with better definitions and better practice

in general or liberal education, and discusses some new approaches at Minnesota.

Redfield, in Chapter VIII, is much affected by the lack of integration and comprehensiveness in specialization in the social sciences with the specific objectives of method, theory, and history in the social sciences to focus upon its underlying philosophy and understanding.

The last three chapters by Bogert, Colwell, and Himstead, respectively, discuss the perplexing issues of dictatorship, democracy, and personal freedoms involved in the problems of faculty participation in the government of higher educational institutions.

All of these papers are valuable because they present these issues as foci of current thinking. They show trends and don't pretend to settle the incident problems.

—A. W. H.

STEWART, ORA PATE. *Pages from the Book of Eve.* San Antonio: The Naylor Company, 1946. 249 p. $3.00.

Pages from the Book of Eve is the fictional autobiography of Eve Collier. It is the delightful story of life in a family of ten children each of whom is an unusual personality. The scene is laid on a Wyoming ranch. What a happy, wholesome, life did the Collier's live—lots of adventure, fun, hardship, good times. Surely it could happen only in America, and the Colliers are the kind of people who have made America what it is.

—G. E. D.

FRAILEY, L. E. "CY". *This Way Up.* Chicago: American Technical Society, 1946. 229 p. $2.00.

This Way Up is an inspirational talk intended primarily for young men and women. It is a psychology of human relationships practically applied. It is based on years of study and observation by the author who has been a successful business man. He answers the questions as to why some men get ahead in busines and others lag behind.

Any young person will thoroughly enjoy reading the book and in every likelihood will profit very much personally from such a reading. It would be a good book for guidance classes and teachers.

In addition to such obvious essentials to success as honesty, imagination, persistence, patience, and the like he lists as attributes of Big Men: (1) admit their own mistakes, (2) pay no attention to false critics, (3) scorn titles when work is to be done, (4) are not spoiled by success, (5) see light where little men see shadow, (6) do not humiliate fellow workers, (7) can "take it" and ask for more, (8) fight on in victory or defeat, and (9) live close to God and nature.

—G. E. D.

HOROWITZ, CAROLINE, AND HART, HAROLD. *The Jumbo Fun Book.* New York: Hart Publishing Company, 1946. 190 p. $1.50.

The Jumbo Fun Book not only is interesting reading but also serves excellently its major purpose: entertainment in the home, at social parties, the school clubs, school stunts, and school assemblies. There are board games, puzzles, quizzes, pencil games, things to make, things to do, comic rhymes, jokes and boners, tricks, mazes, word games, and fascinating facts. Answers are given in the back.

—G. E. D.

DUFRESNE, FRANK. *Alaska's Animals and Fishes.* New York: A. S. Barnes and Company, Inc., 1946. 297 p. $5.00.

Teachers of geography, biology, and zoology will be interested in reading this book. On the inside back covers of the book is a map of Alaska showing the distribution of twelve animals and fishes. Pupils could easily reproduce the map on a large scale map of Alaska and by means of symbols graphically show where the moose, reindeer, bear, seals and other animals are found. The author uses a descriptive style that reminds one of Dr. I. Q., although he tells you the name of the animal and you do not have to guess it. Again, the material is all here for interesting games. Students may describe either written or orally the various animals, the one of his choice and the classmates may guess and learn at the same time. For example, what animal is built for aquatic life, weighing thirty to seventy pounds; its legs are short and the hind feet are fully webbed and the large, flat, scaly tail is a distinguishing characteristic as is the split claw on the second hind toe?

Frank Dufresne, the author, has hunted, fished, guided, explored and carried on his work as a naturalist for a period of twenty-four years in Alaska. From the marine-like climate of southeast Alaska to the bitter land of the Arctic, his name is familiar. During much of this time he worked in the official capacity of Fish and Game Commissioner.

Fourteen plates in full color and innumerable drawings in pencil and pen-and-ink illustrate the text completely. Bob Hines, one of the most talented of young wildlife artists, makes his debut as a book illustrator in *Alaska's Animals and Fishes.*

The fourteen plates in full color are masterpieces. The seals, the black bears, musk ox, Alaska mountain goat, and the one of the big game caribou bear out the above statement.

The Al-Can highway may yet be a reality and a means of going to another frontier land, Alaska where men will hunt, fish, travel, rest, and vacation. The moose of the Kenai region are the largest of their kind in the world. The moose, mountain sheep, and the mountain goats, all have suffered at the hands of ruthless or thoughtless hunters, though fortunately theirs is a range so great, and so difficult of access

that all could not be reached before better understanding brought protective laws under which they remain in the expanding future of the great territory that is their home.

The author states, "In becoming acquainted with Alaska's wild animals one is not able to avoid some rugged experience. The territory is big and beautiful, but it is not always friendly. Its torrential rivers, its mountainous seas and its winter storms are not to be trifled with. My notes gathered over a period of twenty-four years in Alaska bring to light innumerable instances when the search for wildlife information brought only adventure; when but a single worthwhile note, or perhaps none at all, resulted from days of travel."

The foreward and introduction as well as the entire book is rich in information of scientific value. Indeed it is a book for the naturalist as well as the general reader. —F. M. D.

VON HAGEN, VICTOR. *South American Zoo.* New York: Julian Messner, Inc., 1946. 182 p. $2.50.

This is a Junior Literary Guild selection for young people, beautifully illustrated by Francis Lee Jaques. The author sees South America as one gigantic zoological garden with the animals grouped into four sections of South America determined by their physical nature and their food supply, animals of the mountains, the jungles, the pampas and the islands. Here is a book, informative in its content, sweeping in its scope and enjoyable to read by both young and old are the stories of the chinchilla, the jaguar, birds and armadillos, insects and reptiles, and other animals that make up the South American zoo. —G. O.

POTTER, ROBERT D. *Young People's Book of Atomic Energy.* New York: Robert M. McBride & Company, 1946. 171 p. $2.50.

This is first book on atomic energy written primarily for young people 12 to 16 years of age. Adult books on atomic energy are usually too technical for young readers (and for some adults, including many elementary science and other non-chemistry or physics teachers, too). If so, here's the most elementary book that the reviewer has chanced across. The author is a trained scientist and teacher, and a well-known science writer. He was an observer at the atomic bomb tests at Bikini Atoll.

The first forty pages of the book describe the above and below water bomb tests at Bikini. He describes the suspense of the observers, what he, as an observer saw as the bombs exploded and afterwards. It is an excellent word description of a great experiment.

The next forty pages or so describe the steps leading up to the making of the atomic bomb—the first work of Otto Hahn in Germany in 1938, the important interpretation of Dr. Lise Meitner, and the later work of American scientists as they produced the raw materials for the atomic bomb. Then follows chapters on energy and machines that smash atoms—the Cyclotron, Van de Graaff atom smasher, the betatron, and the proposed synchrotron.

The last six chapters discuss atomic medicine, the atomic powerhouse of the sun, future sources of atomic power, atomic control of weather, atomic power costs, and world control of atomic energy.

The use of artificially made radioactive elements in the treatment of certain diseases and in studying physiological reactions in the body is very promising. The use of atomic energy as sources of future power are also very promising, but the exact nature of this source and its method of production and handling are problems of the future that most probably will be satisfactorily solved.

The author suggests the possibility of atomic energy being used to control ocean currents, making water available to all desert areas, and so on. Cost of atomic energy for large scale use is not likely to be prohibitive. Atomic energy should be under international control, but the only sure way to prevent destructive wars is to outlaw war itself.

—C. M. P.

STALL, DOROTHY. *Chukchi Hunter.* New York: William Morrow & Company, 1946. 224 p. $2.00.

This is the story of Ankat, a Chukchi boy, who lives near the top of the world on the eastern tip of Siberia. Ankat's ancestors have been sea-hunters for hundreds of years, uninfluenced by the outside world until in recent years. An outboard motor bought by Ankat's father forms the basis of a delightful story as it's purchase is much opposed by some. But it brings adventure to Ankat, a daring rescue of his father, more food for everybody, and new friends. Boys and girls of the upper grade and junior high school level will enjoy this book very much.

The author has taught a number of years at the famed Little Red School House in New York City, attended Teachers College, Columbia University and traveled extensively in the United States. —C. M. P.

WITTICH, WALTER A., AND FOWLKES, JOHN GUY. *Audio-Visual Paths to Learning.* New York: Harper and Brothers, 1946. 135 p. $2.00.

This is a report of an experiment to determine effective ways in which sound-films can be used in the instruction of children in the fourth, fifth and sixth grades. The methods investigated were: (1) the viewing of a sound film after a meager and casual introduction, followed by a series of test questions based on the film; (2) a preliminary preparatory study with vocabulary study and guide questions taken from the film, followed by seeing and hearing the film, and a test taken immediately after exposure to the film; (3) the use of the same procedure as used in

method 2 plus a discussion, a second showing of the film, and a repetition of the test. The additions in method 3 came 24 hours after the first showing of the film.

These methods are elsewhere described by the authors as "no anticipation," "half-anticipation," and "full anticipation." A rotation process was used in which each selected film was shown by each procedure to different groups of children, but the rotation carried out so that each group saw different films under each of the experimental conditions.

In every case in each of the three grade groups the "full anticipation" procedure gave improvements approximately double those attained by the "no anticipation" procedure. The "half-anticipation" procedure gave approximately 50 per cent of the improvement shown by the "full-anticipation" procedure. Reading grades were correlated with the achievement of pupils on the tests covering content of the films used.

The investigators reported that "children with a low and those with a high IQ seem to be motivated equally and to learn to a comparable degree from educational sound films." This latter conclusion contradicts the basic assumptions of psychology and needs further investigation before it can be proposed for general acceptance.

All films used were Encyclopedia Brittanica films. The introduction to the study was written by the Vice-President of the Encyclopedia Brittanica Films Company.

The study makes a much needed departure into the problems of the school use of educational films. Its reading is recommended for teachers in general and especially for school administrators.

—R. K. W.

CARMICHAEL, LEONARD (Editor). *Manual of Child Psychology.* New York: John Wiley and Sons, Inc., 1946. 1068 p. $6.00.

This is a compendium of modern information, giving the most complete bibliographical survey of the literature on child development now available. Each of the nineteen chapters is by an authority in that field. Each chapter has a selected, up to date bibliography. This manual is an advanced-level text book that bridges the gap between the varied elementary textbooks and the scientific periodical literature of psychology. It presents an accurate and coherent picture of some of the most important aspects of research in the psychology of human development.

Chapters and authors are as follows: Methods of Child Psychology by John E. Anderson; The Onset and Early Development of Behavior by Leonard Carmichael; Animal Infancy by Ruth M. Cruikshank; The Neonate by Karl C. Pratt; Physical Growth by Helen Thompson; The Ontogenesis of Infant Behavior by Arnold Gesell; Maturation of Behavior by Myrtle B. McGraw; Learning In Children by Norman L. Munn; The Measurement of Mental Growth in Childhood by Florence L. Goodenough; Language Development in Children by Dorothea McCarthy; Environmental Influences on Mental Development by Harold E. Jones; The Adolescent by Wayne Dennis; Research on Primitive Children by Margaret Mead; Character Development in Children—an Objective Approach by Vernon Jones; Educational Development by Arthur T. Jersild; Behavior and Development as a Function of the Total Situation by Kurt Lewin; The Feeble-Minded Child by Edgar A. Doll; Gifted Children by Catherine Cox Miles; Psychological Sex Differences by Lewis M. Terman; and a Graphic Age Conversation Scale by Dorothea McCarthy.

—C. M. P.

SEYMOUR, FLORA WARREN. *Pocahontas: Brave Girl.* Indianapolis: The Bobbs-Merrill Company, 1946. 192 p. $1.50.

Readers who have read *Bird Girl: Sacagowea* know what a treat they have in store for them in reading the author's story of Pocahontas, an equally delightful Indian girl. The author is an authority on Indian life and a good story-teller. Much that was said regarding Meriwether Lewis reviewed above is true of this book, also. Pocahontas who saved John Smith's life and later became the wife of John Rolfe stands as an example of unmixed loyalty and friendship.

Again much of the material is fictional, but the scientific observations and the main thread of the story are based on as much accuracy as possible. Again, this is an excellent book for the school library.

—G. B. K.

KINGSLEY, HOWARD L. *The Nature and Conditions of Learning.* New York: Prentice-Hall, Inc., 1946. 579 p. $6.00.

Learning is regarded as an active process through which the activities of the individuals are altered in various ways. Changes in the tendencies and predispositions that control these activities are considered the immediate results of learning. Learning is the core of educational psychology. Laboratory research provides the most reliable data concerning the fundamental nature and conditions of learning. Laboratory findings must be supplemented by classroom studies on learning.

Part I discusses the nature of learning. Part II: six fundamental principles of learning (maturation and learning, varied activity and trial and error learning, repetition, motivation, conditioning, relationship and organization); Part III: improvement, the learning curve, and physical handicaps to learning; Part IV: seven forms of learning (motor skills, perception, memorizing, comprehension, solving problems by thinking, emotional activity, and attitudes and ideals); Part V: retention and transfer of learning.

Altogether this is a most helpful, practical, and complete treatise for teachers and students of education who are interested in the more recent findings in laboratory studies of the learning process and their implications for teaching.

—C. L. D.

HOROWITZ, CAROLINE. *A Boy's Treasury of Things-to-do.* New York: Hart Publishing Company, 1946. 93 p. $1.50.

The first project described in this book would be of interest not only to a boy nine to twelve years of age but also to his parents. During summer vacations when boys are not in school and not doing chores they hunt for things-to-do, games to play. They like to make things. This little book tells what materials will be needed, directions and picture illustrations that will be most helpful. Memory test, Puppet show, Raisin relay, Suitcase surprise race, and Who Am I are examples of some of the fun.

—F. M. D.

HOROWITZ, CAROLINE. *A Young Boy's Treasury of Things-to-do.* New York: Hart Publishing Company, 1946. 93 p. $1.50.

Materials to use, directions to follow, and picture illustrations to guide a small boy in making various projects is the purpose of the book. The book is for boys six to nine years of age. Some of the projects are the same as that given in the book for girls six to nine so in a family where there are boys and girls six to nine years of age probably in buying the book either one of the two would do for both. However, several projects are different. Elementary school teachers will find the book useful. —F. M. D.

HOROWITZ, CAROLINE. *A Girl's Treasury of Things-to-do.* New York: Hart Publishing Company, 1946. 93 p. $1.50.

Things-to-do are suggested for ages nine to twelve. Materials and directions how to do it with pictures illustrating procedure to follow will be a delight to girls of this age. How to make a sweet-spice sachet, stage designing, potato stamp printing, Susie Shy lapel doll, party place-cards, doll house and doll house furniture are examples of some of the projects. How to play interesting games may be learned also from the book. This is a useful book for elementary teachers. —F. M. D.

HOROWITZ, CAROLINE. *A Little Girl's Treasury of Things-to-do.* New York: Hart Publishing Company, 1946. 93 p. $1.50.

The book takes into consideration many simple things children usually do from six to nine years of age. The child is told what materials to use (for the most part they are inexpensive and of little other value) and how to make a shoe-box cradle, sewing cards, double-decker doll bed, top, bean bag, book-marks, etc. How to play Slapsie, Hunt the Slipper, Simon Says, Old Maid and other games. The how-to-do-it pictures will help the child to read and follow directions and make various things without much help from anyone else. Teachers, parents, librarians, and nurses will be glad to know about the book and its many helpful suggestions. —F. M. D.

BEATY, JOHN Y. *The Mountain Book.* Chicago: Beckley-Cardy Company, 1944. 239 p. $1.35.

Two boys from Montana, Dan and Jim learn about Going-to-the-Sun Mountain and many other geological and scientific facts while on their adventure. It is a new elementary science reader suited to grades 5 to 7 inclusive. It is a book of definitions carefully explained and learned from first-hand observation. What is a mountain, the kinds of mountains, how they are made, and how a mountain may be old and then become young again. From it one can learn about a bird that cannot walk and why—it is also the only bird that can fly backward. Any boy or girl the age of Dan and Jim could profit by reading this book before making a trip to Glacier National Park or any mountainous area.

—F. M. D.

BEATY, JOHN Y. *The River Book.* Chicago: Beckley-Cardy Company. 256 p. $1.35.

Jack and Bill explore a river and learn many facts that are typical of all rivers. This science reader is for grades 5 and 6 inclusive.

The insect, plant, and animal life of the soil and water, and man and his industries along the river are studied and told about by the boys.

The economic and cultural value of the river, its boats and bridges and rich agricultural lands along its banks offered a rich source of information and a field for experimentation and observation for the boys, which they share vicariously with other boys who may read the book.

—F. M. D.

WEIL, ANN. *Animal Families.* New York: Greenberg; Publisher, 1946. 32 p. $1.50.

The kindergarden and first grade children will enjoy having this beautifully illustrated little book on their reading table. It is illustrated by Roger Vernaim. The mother, father, and baby of various animals are shown and the correct name for each given. For example, in the sheep family it is ram, ewe, and lamb. Chickens, pigs, rabbits, sheep, geese, donkeys, cats, turkeys, dogs, robins, cattle, goats, ducks, horses are the animal families the child can learn about from the book.

—F. M. D.

KELWAY, PHYLLIS. *The Squirrel Book.* New York: William Collins and Sons, 1944. 78 p. $1.00.

Miss Kelway and Blackout, her dog found two little squirrels in the woods. She named them Yump and Nuffles. She took them home with her and after careful feeding, she finally put them in an outdoor enclosure where they became more adjusted to a natural environment. She decided to take them back to the woods where she found them but did not just turn them out without a home but took along the box-nest where they had lived and hung it in a tree and there they lived and slept contentedly. She visited them often and they scampered about over

her shoulder and down to her pockets where they found nuts and food she had brought them.

One day she found Nuffles in the process of building a new nest and the next day there were four baby squirrels in it. A new chapter was beginning and some day we hope Miss Kelway will tell us more about Yump, Nuffles and the four little squirrels. This is a small book, only 78 pages and for the first, second, third, or even fourth grade teacher who is trying to find a good book to read to her pupils or one to recommend to them to read I can suggest, *The Squirrel Book.*

The children will learn about the habits of the squirrel, what they eat and how they build their nest and live throughout the cold winter. There are a number of photographs and illustrations in the book which the children will love to see and if they have an opportunity they will want to see the pictures more than just once—so the book should be left on the teachers desk or on the Reading table where they can look, read, and enjoy as much as they wish.

Miss Kelway is also the author of *Hedge Folk in Twilight, Swift Movement in the Trees, Widow Hedgehog, Little Animal Club, A House in the Woods, The Ark and The Otter Book.*

—F. M. D.

KELWAY, PHYLLIS. *The Otter Book.* New York: William Collins and Sons, 1945. 144 p. $1.50.

The Otter Book is the story of the naturalist Miss Kelway, an Englishwoman, finding a small otter, taking it to her home and feeding and caring for it until one year of age. The otter, somewhat snake-like and dog-like, although a pet did not prove to be the type of pet many of us would wish to have around. Miss Kelway was both philosophical and sentimental in the taming of the wild creature, the otter. It is a book more suited to the adult than the juvenile reader. The animal and bird life in the environment which she describes is that typical of moorland areas of England and Scotland. The otter is seal-like also and playful at times, like a kitten. She describes the living habits of the animal and in one year's time it had grown to weigh fifteen pounds or more. —S. M. A.

SCHNEIDER, HERMAN AND NINA. *Let's Find Out.* New York: William R. Scott, Inc., 1946. 39 p. $1.25.

This is an elementary science book usuable by pupils in the intermediate grades or by the teacher in the primary grades. Numerous clever and interesting illustrations by Jeanne Bendick supplement the textual material.

Let's Find Out includes the following experiments: (1) what happens to metal when heated, (2) what happens to other things when heated, (3) where heat goes when something cools off, (4) if heat travels faster through some things than others, (5) if heat helps water dry out things, (6) how to make your own steam, (7) how to make your own fog, (8) how to make your own rain, (9) if air is real, (10) if air can lift heavy things, and (11) what makes an airplane stay up in the air.

—R. J. A.

SELSAM, MILLICENT E. *Egg to Chicks.* New York: International Publishers, 1946. 32 p. $1.00.

The changes that take place from the time the egg is laid until the time the chick pecks its way out of the shell is the theme of this elementary science book. Step by step, the clear lively text and pertinent illustrations, many in colors, shows how an egg changes into a chick, typical of the unfolding pattern of all animal development.

The author, a teacher of biology, has made a fairly difficult aspect of science teaching, quite understandable for intermediate grade pupils for whom it is intended.

—R. J. A.

SCHMIDT, KARL PATTERSON. *Our Friendly Animals and Whence They Came.* Chicago: M. A. Donohue and Company. 64 p. $1.50.

The origin of domestic animals, the dog, cow, horse, sheep, goat, and cat are given. There are twelve large colored illustrations of animals in their natural environment. The dog seems to have been the very first animal domesticated by any of the prehistoric tribes of man. The cat seems to have been a native wildcat tamed in ancient Egypt. The author states that the longhorn cattle of Texas are almost extinct, but we hope that the state of Texas may give them a reservation and preserve the breed for the sake of its historic interest. Boys and girls will enjoy reading about some goats in Africa that have transferred their climbing instincts to climbing in trees. Many excellent pictures in color supplement this unusually fine book. It is recommended for elementary and secondary science teachers and pupils. —F. M. D.

BOULTON, RUDYERD. *Traveling with the Birds.* Chicago: M. A. Donahue and Company. 64 p. $1.50.

This is a book on bird migration and it is beautifully illustrated by Walter Alois Weber. There are twelve colored, large full-size pictures of birds. Some interesting facts learned from this book are: It is very strange that birds that live in the northern part of the world are much more migratory than their cousins in the south. Spring and fall are the seasons when most birds are migrating, but in every month of the year some birds can be found traveling. A bird does not have a very good memory for details. Most birds remember things well for only a few days. "Sense of direction" means that a bird or animal is able to go away from its home to some definite place and then come back.

The cowbird is the laziest bird in the country. Among many kinds of birds, the old ones mi-

grate first and the youngsters are left to follow as best they can. Many birds migrate by night and of course they cannot see any land marks then. The only way left is to know the way by instinct.

The golden plover is one of the long distance champions while the chickadee is a stay-at-home. The purple grackles fly in roving gypsy flocks in making their migrations, and they are good harbingers of a change in season. This book is suited to the upper intermediate grade level. Many fine illustrations and colored photographs supplement the textual material. Excellent for elementary and secondary science pupils.

—F. M. D.

HENRY, MARGUERITE. *Birds At Home.* Chicago: M. A. Donahue and Company. 88 p. $1.50.

No teacher of the primary grades can well afford to be without this beautifully illustrated bird book. The jacket picture duplicates the artistic cover of the book. It contains twelve full-page color illustrations by Jacob Bates Abbott. Also, there are many black and white illustrations throughout the book. Ornithology, elementary science, and art are three subject matter fields that are enriched by this book. It is readable and few of us have ever realized the number of insects and weed seeds that are eaten by the birds in a single day. In the book you can find the answers to the following questions: What bird has a name that comes from an old English word meaning "flutterer"? What bird caused a law to be made that no more foreign birds could be brought to the United States without permission? What bird cocks its head, not to hear the earthworm, but the better to see him? What little mother bird can't sing but just sputters and scolds? What bird is so popular that four adjoining Middle West states have chosen it as their state bird? What pair of birds may have five sets of twins a season? What birds have the noisiest cry babies in the bird world? What birds lay eggs that look as if a small child had scribbled on them with a leaky pen?

The book is ten by twelve inches in size, giving some idea of the size of the large colored pictures should the teacher wish to use them for appreciation and study in the classroom. In identifying the birds I think if the teacher is able to tell the children some of the interesting facts about a particular bird such as is given in this book, the child will learn to identify the birds and remember them. For example when the Wood thrush mother birds suspects mischief, she cries, "Quit! Quit!" in no uncertain terms. When the father bird sizes up the situation he usually settles it with, "Tut, Tut." The flicker has a call which suggests its name—"Flicka, Flicka, Flicka!"

Other birds told about in the books are the blue jay, grackle, ruby-throated humming bird, brown thrasher, bluebird, catbird, red-headed woodpecker, junco, goldfinch, chickadee, and the scarlet tanager. The last chapter, *The Ways of the Birds,* contains information of interest to all bird-lovers. This is an ideal gift book for a child.

—F. M. D.

PRESTON, RALPH C. *Science: An Approach in the Elementary School.* Philadelphia: Professor Ralph C. Preston, School of Education, University of Pennsylvania, 1945. 39 p. $0.40.

Using an imaginary discussion style of writing, the author succinctly and quite successfully discusses science in the elementary school. Conversations are built around the following topics: (1) How should science be studied? (2) Where does science belong in the curriculum? (3) What can we do to make concepts "stick"? (4) How can classrooms serve as laboratories? (5) Imagination and emotions: do they mix in science? and (6) Are classroom teachers competent to handle science? A bibliography on readings in science for the elementary school teacher completes the report.

The author is Associate Professor of Education at the University of Pennsylvania where he has been since 1941. He completed his graduate work in education and psychology and Teacher's College the same year. He has been a classroom teacher in six elementary schools and served as a consultant in science for elementary and junior high schools.

—R. J. A.

ANONYMOUS. *Science in the Elementary School.* Sacramento, California: California State Department of Education, 1945. 418 p. $1.00.

In educational circles throughout the country there is a fast-growing appreciation of the fact that science has a tremendously significant contribution to make to childhood education. The current curricular instruments for fashioning this contribution are highly diversified in nature and scope. This California State Department of Education publication, in the opinion of the reviewer, is one of the most valuable and exciting that has come to his attention. It embodies an excellent expression of a sound philosophy of elementary science education; a wealth of suggestions on the collection, care and use of living materials in the classroom; a curriculum based on the needs and interests of children at various maturity levels; samples of integrated units of work; and lastly, intelligently arranged and broadly inclusive annotated lists of science book references for teachers and for children.

References given in each chapter lead the reader to many sources of relevant materials. The language is simple and direct throughout. Fine illustrations were contributed by various California schools. Printing, size of type, paper, binding and format are more than adequate.

Although the sample units of work are stimulating, they do not seem to explore sufficiently

the inherent possibilities of an integrated unit. Since the planning of integrated units calls for a high order of skill on the part of the teacher, it would be helpful to those who are less skilled to get detailed information on the techniques to be employed for this purpose.

Here is a book from which elementary school teachers throughout the country may derive inspiration and guidance.

—JEROME METZNER

BEBENROTH, CHARLOTTA M. *Meriwether Lewis. Boy Explorer.* Indianapolis: The Bobbs-Merrill Company, 1946. 182 p. $1.50.

Boys and girls of any age—the younger when the story is read for them—the upper intermediate and junior high when they can read it themselves—will thoroughly enjoy this story of the youth and young manhood of one of America's most famous explorers. Although the conversation and much of the description is necessarily fictional, yet the main thread of the story is based on historical fact and much careful research on the part of the author.

The scientific observations have been carefully checked. The author has a talent for telling stories that boys and girls enjoy. This is one of the *Childhood of Famous American Series.* It is recommended for the school library and is much superior to so many books that boys and girls read. Maybe through reading it, they will re-live and re-enact the adventures of Meriwether Lewis rather than some comic strip or radio character they now try to imitate. —G. B. K.

NEELY, HENRY M. *A Primer for Star-Gazers.* New York: Harper and Brothers, 1946. 334 p. $3.75.

This book is exactly what its title implies—a primer for people entering the kindergarten of astronomy. However it is not a book only for children but for any reader who knows nothing about the stars whatever, feels that the whole subject is too scientific and mathematical for him, has no intention of making a real study of it, but would simply like to recognize the principal stars and constellations. The author states that "this book is an effort to rescue the ancient love of simple star-gazing from the avalanche of mathematics and physics with which modern astronomy threatens to bury it."

The book features "sky-pictures", nearly a hundred of them, instead of the conventional and difficult star maps given in most books. There is a complete star calendar which indicates what stars an observer will see any evening one hour after dark, but there is an arrangement by which the chart can be used for any other hour of darkness.

The textual material is interestingly written and keys for the pronunciations of the names of various stars accompany the textual material about them.

Elementary science teachers and laymen will find this book one of the best guides, if not the best, for her initial efforts toward learning and recognizing the individual stars and constellations. She will not need the aid of anyone in using this primer. Brief usage will give her a confidence and a thrill never before experienced in the beginning of a study of a new science.

—G. B. K.

GRIDLEY, MARION E. *Indians of Yesterday.* Chicago: M. A. Donohue and Company, 1946. 64 p. $1.00.

This is a beautifully illustrated book about the earlier Americans. Miss Gridley, Chief Story Teller for the Indian Council Fire, is an authority on Indian legend, culture, and customs. Here she tells many interesting facts about the people who were the ancestors of our Indians of today. The influence of the plains, mountains, forests, and deserts on their manner of living and customs and ceremonies is capably and fascinatingly explained. Effect of environment are interwoven with the history. The illustrations, some in full page (9 x 10½) color, are by Lone Wolf, Blackfoot Indian, who today is the foremost Indian painter of Indians and life in the Old West.

The textual material is suitable for junior or possibly upper grade level pupils, but will appeal to adults as well. This is an excellent book for any school library. —G. B. K.

MONTGOMERY, ELIZABETH RIDER. *Keys to Nature's Secrets.* New York: Robert M. McBride and Company, 1946. 64 p. $1.50.

This is a series of elementary science experiments appropriate for children in the primary grades. Simple experiments, requiring no complicated apparatus, are presented in sound, light, musical sounds, air, heat, levers and expansion. Children will enjoy the appealing illustrations by Mary Stevens. Primary children will get both enjoyment and science training in performing the described experiments. —G. B. K.

SCHMIDT, KARL PATTERSON. *Homes and Habits of Wild Animals.* Chicago: M. A. Donohue and Company, 1946. 64 p. $1.50.

This reprint of one of the finest and most beautiful books on the homes and habits of wild animals, is most timely. The textual material is by Mr. Karl Schmidt, well-known naturalist, and the paintings and drawings are by Walter Weber, well-known for his works on animals and birds. Numerous 9 x 10½ illustrations in color are found throughout the book.

The book will appeal to all levels of interest—children and adults. The textual material should be easily read by most upper grade children. There are colored pictures of the wolverene, beavers, snowshoe rabbit, jaguar, marten, red squirrel, bear, caribou, otter, opossum, fox, bat, kangaroo, rat, armadillo, badger, and golden marmot.

This book is especially recommended to the elementary science teacher. —G. B. K.

WOODALL, SALLY LEE. *The Animal A B C.* New York: U. S. Camera Publishing Corp. 1946. Unpaged. $1.50.

Here is an elementary science book for the kindergarten and up. It is an animal alphabet in pictures—all the animals from apes to zebras. The text is in simple, rythmic verses—whimsical and humorous—accompanied by the finest photographs in the field of animal photography. There are also delightful, gay colored illustrations by Elmer Lasher. Yes, the elementary science teacher and other grown-ups will enjoy this fine addition to the elementary science book shelf.

Here are three illustrations of the whimsical verse:

A is for ape
and A is for ant;
One hangs by his tail,
the other one can't.

U is for unicorn
and U is for you;
Two funny creatures
not found in a zoo.

M is for mouse
and M is for mule,
A stubborn old fellow
who won't go to school.

—G. B. K.

BEATY, JOHN Y. *The Ocean Book.* Chicago: Beckley-Cardy Company. 1946. 240 p. $1.35.

Two boys and the author explore the sea from the tide lines to the ocean depths and learn about the life cycle and struggle of existence of oceanic creatures; about star fishes, fiddler crabs, sea horses, sharks, and big and little animals of the sea; about tides and currents and waves; earthquakes and volcanoes in the ocean and how the sea influences the life of man. *The Ocean Book* is recommended for grades 5–8, but many an older boy or girl will enjoy this delightful narrative about the plants and animals of the ocean and their environment. Seventy-five illustrations from unusual photographs make the book very attractive and interesting to the reader. Teachers in the elementary grades who must also teach science will welcome a book of this kind.

—G. O.

EDELSTADT, VERA. *Oceans in the Sky.* New York: Alfred A. Knopf, 1946. 60 p. $1.75.

Miss Edelstadt in *Oceans in the Sky* is telling in poetic prose the exciting story of water, the ever-moving water cycle which makes life possible and man's development what it is today—water for transportation, fishing and farming.

"Man built his cities on the rivers
so he could be sure to have
a fresh supply of drinking water
for himself and for his animals
and for watering his plants . . .

"He invented ways to harness it
to do the hardest jobs,
and keep on doing them
without resting."

Mindful of man's thoughtlessness, the author also shows how conservation of water by flood control, by planting forests and saving soil will bring man more power. Louis Bunin complements this fascinating story with delightful illustrations. What an exciting story for the classroom! This is a *must* for our libraries. —G. O.

FREEMAN, MAE AND IRA. *Fun With Figures.* New York: Random House, 1946. 60 p. $1.25.

Fun With Figures is a series of easy experiments with triangles, squares, circles, ovals, ellipses, parabola, spirals, helix, and other shapes drawn and used in geometry. Excellent and numerous illustrations not only show how it is done, but also use illustrations of these designs as used in buildings, bridges, tunnels, machines, and so on. This is an interesting book for any one interested in making geometrical figures, in geometry, and in construction design.

—G. B. K.

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J. B. LIPPINCOTT COMPANY — Chicago–Philadelphia–New York

HART, HAROLD. *The Jumbo Entertainer.* New York: Hart Publishing Company, 1946. 384 p. $2.50.

Whether for science clubs, school assemblies, school parties, home parties, or individual, you will find plenty to interest and entertain in this book. It is a fine book for any science teacher to have around when pupils in his class, home room, or science club want some ideas for this or that. Many teachers have been waiting for a book just like this. It is a fine book to have in the library, too.

Here are wisecracks, nonsense verse, boners, epitaphs, limericks, crosswords, word mazes, blankies, alphabets, intelligence tests, initialettes, puzzles (problems, cartoons, and true puzzles). There are over 360 illustrations. Oh, yes, all of the answers are given in the back. —C. L. D.

RIPLEY, G. SHERMAN. *An Introduction to Magic.* New York: Sentinel Books, 1946. 127 p. $0.50.

Most people are interested in magic and anyone able to attain some dexterity in its performance can always be assured of an audience. Some good ideas for science clubs, school assemblies, school carnivals, and home and school parties will be found in this book on magic. Some tricks may be accomplished with a minimum of skill, but others will require many long hours of practice and patience. —C. L. D.

SYMPOSIUM. *Food and Nutrition.* Sacramento: California State Department of Education, 1945. 160 p. $0.50.

This publication was prepared under the direction of the Division of Elementary Education of the State Department of Education in cooperation with the Bureau of Maternal and Child Health of the State Department of Public Health. It has been prepared to meet the needs of teachers. Part I discusses Man's Quest for Food; Part II, Basic Considerations Regarding Nutrition; and, Part III, Areas of Experience.

The work has been well done and will prove to be most useful to teachers not only in California but elsewhere. Biology, Health, Chemistry, Home Economics, and Elementary Science teachers will find this one of the finest nutrition and food units published. Practical aspects are emphasized.

It will serve as an excellent reference. The quality of the paper is of the very best and the photographs really stand out. The appendix has a bibliography that includes: (1) References for Teachers—books, pamphlets, magazine articles, periodicals, packets; (2) References for Children—on three grade levels; and (3) Visual Materials. —C. M. P.

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